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YELLOW FEVER.

MARTINI (E.). Tiergeographische Gesichtspunkte zur Beurteilung der Geschichte und Epidemiologie des gelben Fiebers. [**A Zoo-Geographical Survey of the History and Epidemiology of Yellow Fever.**]—Reprinted from *Verhandlungen d. Deut. Gesellsch. f. angewandte Entom. E. V. auf d. siebenten Mitgliederversammlung zu München vom 31. Mai bis 2. Juni 1928.* 1929. pp. 76–81.

An interesting discussion of certain aspects in the problem of the original source of yellow fever. The author brings forward very strong evidence in support of the view that Africa is the original home of the disease and that it was introduced into America very soon after its discovery. The endemic nature of yellow fever in Africa, contrasted with the epidemics of the New World; the subgenus *Stegomyia* being essentially an African group that has spread from there to other parts of the world; and the historical evidence as to the epidemics in Mexico during Montezuma's reign, are among the arguments supporting this view. [The article should be read in its entirety by those interested in the subject.]

E. Hindle.

PEYROT (J.). A propos de la fièvre jaune. [**Yellow Fever.**]—*Marseille-Méd.* 1930. Jan. 25. Vol. 67. No. 3. pp. 132–144.

After an account of some of the recent work on yellow fever, the author discusses certain aspects of the epidemiology of the disease. When in the French Soudan the author helped in a small outbreak of yellow fever which suddenly appeared after a long period without record of cases. Cases of the disease are said to have occurred at Sansanding and Koury in 1902 to 1903, and no more were observed until twenty years later at the neighbouring town of Segou-Sikoro. [These towns are on the upper part of the Niger, 600 to 700 miles from the coast.] In order to explain the persistence of the disease during this latent period the author inclines to the view that unrecognized cases of yellow fever are continually present and serve to maintain the infection in the mosquitoes, which under certain conditions, such as the introduction of non-immunes, etc., may give rise to an epidemic outbreak. It is aptly

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pointed out that prophylactic measures directed against *Aedes aegypti* should never be relaxed, and that if such measures had been systematically applied in Dakar it should not have been possible to find the enormous number of breeding places for mosquitoes furnished by the mass of empty tins, bottles and similar rubbish, amounting in 1927 to more than "50.000 cubic metres." After the yellow fever outbreak this rubbish was cleared away, but it is obvious that for many years the sanitary measures must have been severely handicapped either by lack of personnel, or money, or both.

E. H.

Monteiro (J. Lemos). A febre amarella a luz das modernas acquisições experimentaes. [**Yellow Fever in the Light of Recent Research.**]—*Brasil-Medico.* 1930. May 31. Vol. 44. No. 22. pp. 588–596. [31 refs.]

A clearly stated summary of the work done on yellow fever during the last 2–3 years. All the points referred to have already been noted in this *Bulletin*, with the exception that *Cimex lectularius* can pass the virus still active in its faeces up to 15 days after feeding on an infected rhesus.

H. H. S.

Bauer (Johannes H.) & Hudson (N. Paul). **The Duration of Immunity in Human Yellow Fever as shown by the Protective Power of the Serum.**—*Jl. Preventive Med.* 1930. May. Vol. 4. No. 3. pp. 177–178. [7 refs.]

The authors tested the sera of four persons who had had yellow fever in Mexico, the Panama Canal Zone, or New Orleans, 23 to 26 years previously.

Protection tests were made in monkeys using 5 cc. of the serum for each animal, except in one case when 3 cc. and 4 cc. respectively were inoculated, and a quantity of virus containing at least 1,000 lethal doses was inoculated three hours later. The sera of three out of the four patients protected the monkeys against the disease. In addition serum from patients 4, 8 and 16 years after attacks was found to be protective.

It is evident, therefore, that an attack of yellow fever confers a lasting immunity. Since an African strain of virus (the Asibi) was used in these tests it is also evident that the disease is identical in Africa and America, and the yellow fever of 1902 and 1905 is immunologically the same as that now existing.

E. H.

Public Health Reports. 1930. June 27. Vol. 45. No. 26. pp. 1457–1459. **Quarantine Regulations of Airships against Yellow Fever. Report of the President of the Commission on Yellow Fever at the Meeting of the Permanent Committee of the International Office of Public Hygiene, May, 1930.**

The Commission was of the opinion that it is premature to formulate articles for an aerial convention applicable to yellow fever. Provisionally it recommended that passengers travelling by air and starting from an infected area should be under observation for six days before

embarking and six days after arrival. The Commission held that three days is the limitation of the period during which a person sick with yellow fever should be isolated.

E. H.

DE MELLO (E. Jansen). Medida do progresso e efficiencia dos serviços anti-larvarios nas campanhas contra a febre amarella. **Measure of the Progress and Efficiency of Anti-Larvae Measures in Campaigns against Yellow Fever.**—*Archivos de Hyg.* Rio de Janeiro. 1930. May. Vol. 4. No. 2. pp. 207–219. With 2 figs. English summary.

The author's conclusions are as follows :—

" 1. The use of mosquito indices and of other indices is commendable for measuring the progress and efficiency of anti-larvae measures in campaigns against yellow fever.

" 2. Since each of them has a different meaning and also for the sake of comparison, at least the following proportions should be systematically computed : (1) the ratio of houses with breeding-places to all houses examined (*house index*) and (2) the ratio of breeding-places to the total number of houses visited (*density index*).

" 3. As a complement to these indices, the ratio of breeding-places to the total number of receptacles (*deposit index*) and, likewise, other ratios particularly interesting in special cases and localities, could be used to advantage.

" 4. The ratio of receptacles found with living larvae-consuming fish to the total number of receptacles capable of supporting fish life (*fish index*), which has been proposed by the author, has proved to be a useful measure of efficiency in supplying dwellings with fish.

" 5. The regular observation of the various indices, which is greatly assisted by the graphic method, is capable of providing the administration with a better knowledge of the progress attained and of tendencies in the efficiency of the campaign."

E. H.

SOREL (F.) & ARMSTRONG. Désinfection des immeubles de Dakar à la suite de l'épidémie de fièvre jaune de 1927. [**Disinfection of Dwellings at Dakar after the 1927 Epidemic of Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1928. Nov. 14. Vol. 21. No. 9. pp. 808–816.

In using sulphur dioxide for the destruction of mosquitoes and rodents in Dakar, it was found that much less elaborate sealing up of cracks and crevices was necessary than has been the common practice. Hanging blankets or the like over the principal openings was found to be sufficient.

When sulphur was burnt under such conditions 30–40 gm. per cub. m. was required, the premises remaining closed for 4 hours. Using SO_2 under pressure (from cylinders) 20 gm. of gas with 2 hours closure or 30 gm. gas and 45 minutes closure sufficed. The compressed SO_2 gave the best results since it produces the most rapid saturation of the atmosphere.

Pyrethrum is untrustworthy since the stupefied mosquitoes will recover unless promptly swept up.

J. F. C. H.

Cruz (J. da Costa). [In Portuguese & English.] O diagnostico da febre amarella pela dosagem da alexina. **The Diagnostics of Yellow Fever by Dosage of Alexin.**—*Mem. Inst. Oswaldo Cruz.* 1930. Vol. 23. No. 3. In Portuguese pp. 109–130. [45 refs.] In English pp. 131–151. Also in *Brasil-Medico.* 1930. Feb. 22. Vol. 44. No. 8. pp. 220–230.

The author gives full details of the application of this test, together with a record of the results of examining the amount of complement in 103 cases [see this *Bulletin*, Vol. 26, p. 1003]. Every case of yellow fever showed a diminution in the amount of complement, and in addition, a case of malaria, and five other cases diagnosed clinically as influenza. The amount of complement seems to be of importance for prognosis, as severe cases showed a greater diminution than mild ones. The decrease is found to be mainly due to a loss in the albumin fraction of the complement.

E. H.

Cruz (J. da Costa). Sur un cas curieux de fièvre jaune au point de vue diagnostic par le dosage de l'alexine. [**An Abnormal Case of Yellow Fever and its Diagnosis by the Amount of Alexin.**]—*C.R. Soc. Biol.* 1930. June 13. Vol. 104. No. 20. pp. 623–624. [1 ref.]

This is a further account of a case which, although diagnosed clinically as yellow fever did not show any diminution in the quantity of alexin, and consequently was mentioned as an exception to this rule [this *Bulletin*, Vol. 26, p. 1003]. Protection tests in two rhesus monkeys, using the serum of this patient after his recovery, show that the disease cannot have been yellow fever, for neither of the monkeys was protected. It would seem, therefore, that a diminution in the quantity of alexin is a constant feature in yellow fever, and will help to distinguish it from other diseases which it clinically resembles.

E. H.

Penna (Oswino) & de Figueiredo (Burle). Diagnostic histo-pathologique de la fièvre jaune par les lésions de Councilman. [**The Histo-pathological Diagnosis of Yellow Fever by Councilman's Lesions.**]—*C.R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1346–1347. [Oswaldo Cruz Inst., Rio de Janeiro.]

In order to distinguish yellow fever from other conditions involving necrosis of the liver, the authors point out the characteristic features of necrotic liver cells in yellow fever, especially in human beings. The necrosed cells lose connexion with adjoining liver cells ; they lose their polygonal shape and become more or less ovoid or amoeboid and generally become smaller than normal cells ; the protoplasm is extremely acidophilic ; the cytoplasm becomes hyaline, and homogeneous ; the majority of the cells show neither pyknosis nor karyorrhexy ; in other cases the nucleus disappears and stages in its dissolution may be observed. The necrosis and fatty degeneration generally proceed together in the affected liver cells. In contrast to other liver intoxications in which the cells are destroyed and autolysed, in yellow fever the majority of the cells, although necrotic, persist and can still be distinguished. With regard to both necrosis and fatty degeneration one of the most characteristic features is that even in advanced cases of yellow fever these changes do not occur in the neighbourhood of the

portal veins, whilst in other liver affections the necrosis or fatty degeneration is spread throughout the lobule. In monkeys these changes may be variable, and it is better to depend on the presence of the oxychromatic intranuclear inclusions.

E. H.

Jakob (A.), Fialho (Amadeo) & Villela (End. Lib.). Ueber die Veränderungen im Zentralnervensystem bei Gelbfieber. [**Changes in the Central Nervous System in Yellow Fever.**]—*Deut. Ztschr. f. Nervenheilk.* 1929. Dec. Vol. 111. Nos. 1–6. pp. 111–116. With 5 text figs.

A more detailed account, with microphotographs, of changes in the central nervous system of yellow fever cases obtained during the 1928 epidemic in Rio de Janeiro [see this *Bulletin*, Vol. 26, p. 298]. In addition to the changes previously mentioned in the preliminary note it is of interest that the ganglion cells often showed more or less intense degeneration of the nucleus with fatty degeneration of the cytoplasm.

E. H.

Dinger (J. E.), Schüffner (W. A. P.), Snijders (E. P.) & Swellengrebel (N. H.). Ondersoek over gele koorts in Nederland. (Vierde Mededeeling.) [**Research on Yellow Fever. 4th Communication.**]—*Nederl. Tijdschr. v. Geneesk.* 1930. May 31. 74th Year. 1st Half. No. 22. pp. 2732–2741. [5 refs.]

The 1st (this *Bulletin*, Vol. 26, p. 1006) and 2nd and 3rd communications [*ante* pp. 485–6] have already been noticed. In this article the marked difference in susceptibility to yellow fever of adult *M. cynomologus*, as compared with the great susceptibility of the closely allied *M. rhesus*, is made the subject of special commentary. The general impression is that young animals, including man, are less susceptible than old. But the contrary is found to be the case with *M. cynomologus*. It seems probable then that the insusceptibility of the older animals must be acquired and the question arises, how? One thinks immediately of the possibility of some allied disease as the immunizing agency, since yellow fever itself is not known to occur in the Dutch East Indies. The dengue group of fevers is the most likely possibility in the case. Attention has already been drawn to the similarity between these two diseases as shown by the tendency to affect the new comer, the saddle temperature curve, the clinical symptoms (muscular pains), the transmission by *Aedes aegypti*, the duration of the " extrinsic incubation," the duration of infectivity of the patient's blood (first 3 days) and the filtrability of the virus. On the other hand experiments with the serum of dengue convalescents have failed to show neutralization of yellow fever virus, and it has not been accepted in the southern states of North America that an attack of dengue protects against yellow fever. Experimentation, however, on these lines is being carried out and the results should prove interesting. Another species of monkey, commonly found in Sumatra, *M. nemestrinus*, has also been found to be little susceptible to yellow fever inoculation.

W. F. Harvey.

DINGER (J. E.), SCHÜFFNER (W. A. P.), SNIJDERS (E. P.) & SWELLENGREBEL (N. H.). Untersuchungen über Gelbfieber in den Niederlanden. [**Researches on Yellow Fever in Holland.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Aug. 28. Vol. 118. No. 1/2. pp. 6–12. [Trop. Inst., Amsterdam.]

The first part of this paper was published elsewhere [*ante*, p. 486]. The second part contains records of transmission experiments with a strain of *Aedes aegypti* from Togoland. The first batch of these mosquitoes was fed on an infected rhesus and then respectively, 20 and 30 days later, on normal animals neither of which showed any signs of infection. When subsequently inoculated with virus one of these monkeys was resistant and the other had a non-fatal infection. A second batch was fed on infected monkeys and subsequently after intervals of 22, 37, 61 and 100 days respectively fed on normal monkeys. The monkey bitten by mosquitoes after 22 days' interval showed no signs of infection and when subsequently inoculated with virus died of yellow fever. Four other monkeys bitten by mosquitoes after intervals of 37 to 100 days all became infected and three of them succumbed to the disease. It would seem, therefore, that the extrinsic incubation period of yellow fever in the mosquito may be prolonged under certain conditions.

E. H.

ARAGÃO (H. de Beaurepaire) & LIMA (A. da Costa). [In Portuguese & French.] Novas experiencias sobre a febre amarella. Nouvelles expériences sur la fièvre jaune. [**New Experiments on Yellow Fever.**]—*Mem. Inst. Oswaldo Cruz.* 1930. Vol. 23. No. 2. In Portuguese pp. 99–101. In French pp. 102–104.

—— & ——. Nouvelles expériences sur la fièvre jaune. Quantité de virus chez le moustique.—*C. R. Soc. Biol.* 1930. June 13. Vol. 104. No. 20. pp. 619–622.

The authors triturated three *Aedes aegypti* infected with yellow fever in 1 cc. of distilled water and then made progressive dilutions of the resulting emulsion. Fatal infections were produced in rhesus monkeys by the inoculation of 1 : 10,000, 1 : 100,000 and 1 : 1,000,000 respectively of the original suspension.

In a second series of experiments a single infected mosquito was similarly triturated in 1 cc. distilled water and dilutions of 1 : 1,000, 1 : 10,000 and 1 : 100,000 produced typical yellow fever in rhesus monkeys. Since the volume of the mosquito is very much less than 1 cc. and in both these experiments the dilutions start from the original suspension of this volume, it is evident that infected mosquitoes must contain several million lethal doses of the virus. In addition the authors fed infected mosquitoes on monkeys through flannel in order to avoid any possible contamination by the insects' faeces. Fatal infections were produced in two monkeys and at the same time the faeces were also found to be infective.

Two experiments to determine the minimum incubation period gave conflicting results. In the first case the mosquitoes after 4 and 10 days incubation period respectively failed to infect monkeys, but were found infective after 16 days. In the second case, a fatal infection was produced in a monkey by the bites of 5 mosquitoes, fed through

flannel, after an incubation period of only four days. [The results of this last experiment are difficult to understand for they are at variance with the results of all previous observations, which have shown that the extrinsic incubation period of yellow fever in the mosquito is never less than 9 to 12 days.]

E. H.

Bauer (Johannes H.) & Mahaffy (Alexander F.). **Studies on the Filtrability of Yellow Fever Virus.**—*Amer. Jl. Hyg.* 1930. July. Vol. 12. No. 1. pp. 175–195. [4 refs.] [Labs. of the West African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos.]

An account of filtration experiments with the blood of infected monkeys and infected mosquitoes showing that the virus is able to pass through Berkefeld filters of all grades without any marked diminution in concentration, and also through Chamberland L11 candles.

The most interesting section of the paper is that dealing with the action of various solutions on yellow fever virus, which was found to die out within 6 hours or less when suspended in 0·9 per cent. sodium chloride, Locke's solution, Ringer's solution, hormone broth, or distilled water; when 10 per cent. or more of normal serum was added to saline or distilled water, the deleterious affect of these media on the virus was very much reduced. The deleterious effect of saline on the virus would explain the negative results of previous filtration experiments with infected mosquitoes since in these cases the ground up mosquitoes were suspended in saline solution. When 10 per cent. serum was used as a suspension for the mosquito emulsion, the virus was found to pass through the filter without any difficulty.

The results of titration experiments using 10 per cent. serum, instead of ordinary saline, show that the blood of infected monkeys may contain a very high concentration of virus up to as much as 10,000,000 lethal doses per cc.

E. H.

Lewis (Paul A.). **The Survival of Yellow Fever Virus in Cultures.**—*Jl. Experim. Med.* 1930. July 1. Vol. 52. No. 1. pp. 113–119. [5 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

The author injected various culture media with blood and tissues from rhesus monkeys infected with yellow fever. The virus was found to survive at least 9 days in egg serum medium kept at 35° C., and 12 days in Marchoux's medium at the same temperature. In Noguchi's semisolid medium the virus survived 7 days at room temperature. There was also incomplete evidence of survival for 18 days in egg serum medium, for a monkey inoculated with the culture showed fever and when subsequently inoculated with virus did not succumb, although a rise in temperature was observed. It was believed by the author, who unfortunately died of yellow fever in Bahia on June 30th, 1929, that the infections recorded by Kuczynski may have been caused

by virus surviving in the medium, and not by the visible organisms cultivated. The author obtained no visible growth or reproduction of the virus in any of his cultures. In a series of dilution experiments he was able to infect rhesus monkeys with 0·00001 cc. of infectious blood in the case of two strains, and with 0·000001 cc. employing the Asibi strain.

E. H.

HINDLE (E.) & FINDLAY (G. M.). **The Electrical Charge of Yellow-Fever Virus.**—*Brit. Jl. Experim. Path.* 1930. Apr. Vol. 11. No. 2. pp. 134–136. [5 refs.] [Wellcome Bureau of Scientific Research, London.]

The authors have investigated the electrical charge of the virus of yellow fever, using Bedson and Bland's method of immersing strips of blotting paper in suspensions of the virus in varying hydrogen ion concentrations. If negatively charged relative to the blotting paper, the virus particles ascend the paper and their presence may be detected by inoculating suspensions of the paper into monkeys. It was found that the virus of yellow fever is negatively charged at pH ranging from 5·2 to 7·0 and is destroyed in acid media of pH 3·0 to 4·0.

E. H.

THEILER (Max). **Studies on the Action of Yellow Fever Virus in Mice.**—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 249–272. [11 refs.] [Harvard Med. School, Boston.]

An interesting account of the infection of mice with yellow fever virus. The author inoculated the virus intracerebrally and in every experiment some of the mice became ill and died with symptoms of encephalitis. The virus seems to be capable of being propagated indefinitely in mice by brain to brain inoculations. Whereas the first mice to be infected became ill after 8 to 14 days, by the fifth passage they became ill on the 6th or 7th day, and died the following day. At the 20th passage, the average was one day shorter and the interval gradually diminished until the average of the 50th to the 75th passages was only 5·1 days from the injection to the death of the animal.

When the technique was well established all the mice inoculated intracerebrally became infected, no normal mouse having been found to be immune, although several hundred have been tested. After repeated passages the virus became so virulent that very minute doses were sufficient to produce infection.

Mice were also successfully infected by intraocular, and intraspinal injections of the virus and in all cases showed the pathological picture of those infected intracerebrally. When adult mice were inoculated intraperitoneally as a rule they remained well, but in about two-thirds of the cases became immune to an intracerebral injection; similar results were also obtained by intradermal, intramuscular and intratesticular injections. Young mice, from birth up to about 14 days old, were found to be susceptible to intraperitoneal inoculations of the virus, especially in later experiments. In all cases the symptoms were the same as those after intracerebral infection.

The first sign of illness in infected mice is generally a roughening of the fur and a loss of activity. The following day the mouse is usually very ill, often showing paralysis of the hindlegs, and death occurs that day or the next. At autopsy no constant macroscopic changes can be observed but haemorrhage of the stomach is common enough to suggest that it may be due to the virus. The only sure means of diagnosis is the examination of brain sections, which invariably show an encephalitis and nuclear changes in the ganglion cells resembling the inclusions found in the liver cells of monkeys infected with yellow fever.

From a study of the distribution of the virus in mice it is evidently highly neurotropic in these animals, for it never occurs in the blood and even when inoculated intraperitoneally the virus soon disappears from all the abdominal organs except the adrenal. No matter what method of inoculation was employed, the virus became strictly localized to the nervous system and adrenals. The study of the spinal cord and sciatic nerves of mice inoculated intracerebrally shows that the virus travels centrifugally along the nervous system. Thus the spinal cord is infective three days after the inoculation, whilst the sciatic and adrenal are uninfected; later at the fifth and sixth days the virus is present in large quantities throughout the whole nervous system including the sciatic nerve and adrenal. The passage of yellow fever virus through mice seems to lead to a loss of virulence for monkeys as determined by three experiments. One rhesus monkey inoculated with the virus from three mice at the third passage, 24 days after it had been established in these animals, was dying of yellow fever on the fifth day, and on autopsy showed typical lesions. A second monkey was inoculated with virus at the 29th passage, showed a rise in temperature on the 5th and 6th days, and was found to be immune against a subsequent dose of virus. A third monkey inoculated with material from the 42nd passage in mice, died after 48 days but without any definite symptoms of yellow fever.

The virus in infective mouse brains was found to retain its virulence for at least 160 days at −8° C. Also brains stored in 50 per cent. glycerine at a temperature of 2°–4° C. were still virulent after 58 days, but not after 100 days. A brain kept in saline at 2°–4° C. for 53 days proved just as infective as the glycerinated one, and also had ceased to be infective after 100 days.

The injection of immune serum either intraperitoneally or intracerebrally only exceptionally protected mice against a subsequent inoculation of virus whether given immediately after the serum or after an interval of 1 to 11 days. The intraperitoneal inoculation of virus produced immunity in about two-thirds of the mice, and in addition the intracerebral inoculation of sublethal doses occasionally produced immunity.

Immune monkey serum was mixed with mouse virus and the mixture inoculated intracerebrally into mice; of 10 mice 2 died and 8 were protected, whilst 12 control mice inoculated with a mixture of normal serum and virus all died. Similar results were obtained by the use of human immune serum, one of which was that of a laboratory worker who acquired the infection in the laboratory apparently from the mouse virus in about the 32nd passage.

The neurotropic character of this virus in mice, as well as the pathological changes induced, afford strong evidence that the aetiological agent of yellow fever belongs to the group of filterable viruses.

E. H.

PETTIT (Auguste), ROUBAUD (Emile) & STÉFANOPOULO (Georges). Fièvre jaune du singe consécutive aux piqures par stégomies de Tunisie, de Java et de Cuba. [**The Production of Yellow Fever in Monkeys by the Bites of Stegomyia from Tunis, Java and Cuba.**]—*C.R. Soc. Biol.* 1930. May 9. Vol. 104. No. 15. pp. 60–63. [4 refs.]

The authors give the results of transmission experiments with three strains of *Aedes aegypti* from Tunis, Java and Cuba respectively. A fatal infection was produced in a rhesus monkey by the bites of two of the Tunis strain mosquitoes that had fed on a yellow fever monkey 13 to 20 days previously.

With a Javan strain of mosquitoes that had fed on an infected monkey, a normal monkey, bitten by six insects after an interval of 12 to 13 days, showed no signs of infection, and was shown to be non-immune by a subsequent injection of virus to which it succumbed in six days. A second monkey bitten by 10 mosquitoes of the same batch, after a longer incubation period of 17 to 18 days, seems to have had a non-apparent infection, for when subsequently inoculated with yellow fever virus it was immune. With a Cuban strain of mosquitoes that had also been maintained in Dakar, West Africa, two monkeys were bitten by mosquitoes that had previously fed on the same infected monkeys used in the preceding experiment. One of these monkeys was unaffected and 40 days later was inoculated with yellow fever virus and died from the infection ; the other, although showing no signs of disease, seemed to have had a benign attack, for it was subsequently found to be immune against yellow fever.

E. H.

DAVIS (Nelson C.). **The Transmission of Yellow Fever. Experiments with the "Woolly Monkey" (*Lagothrix lagotricha* Humboldt), the "Spider Monkey" (*Ateleus* [*Ateles*] *ater* F. Cuvier), and the "Squirrel Monkey" (*Saimiri scireus* [*sciureus*] Linnaeus).**—*Jl. Experim. Med.* 1930. May 1. Vol. 51. No. 5. pp. 703–720. With 3 charts in text & 2 figs. on 1 plate. [5 refs.] [Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

An independent confirmation of KUCZYNSKI's observation that the squirrel monkey *Saimiri sciureus* is susceptible to infection with yellow fever [see this *Bulletin, ante,* p. 87]. Particulars are given of the various methods of infection, and the maintenance of the virus through four direct passages in *Saimiri.* Some of the monkeys died of the disease and showed lesions, including liver necrosis, suggesting yellow fever as seen in human beings and *rhesus* monkeys.

In addition the spider monkey, *Ateles ater,* was infected by the bites of mosquitoes and the inoculation of infected blood or liver. Although virus was recovered from these animals the livers showed no signs of necrosis. 3 cc. of the serum of a recovered monkey protected a *rhesus* against infection. In addition, three out of twelve "woolly monkeys," *Lagothrix lagotricha,* showed a rise in temperature after being inoculated with yellow fever virus, but in only one instance was the virus trans-

ferred back to *M. rhesus*. Protection tests were made with sera from four of the monkeys; the sera of three that had been injected with infected blood all protected, whilst in the case of one that had been bitten by infected mosquitoes, but showed no reaction, its serum had no protective action.

E. H.

Bauer (Johannes H.) & Mahaffy (Alexander F.). **The Susceptibility of African Monkeys to Yellow Fever.**—*Amer. Jl. Hyg.* 1930. July. Vol. 12. No. 1. pp. 155–174. [2 refs.] [Labs of the West African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos.]

Attempts were made to infect four species of African monkeys, viz. *Cercopithecus tantalus*, *C. mona*, *Cercocebus torquatus*, and *Erythrocebus patas*, with yellow fever, both by the inoculation of infected blood, and the bites of infected mosquitoes. Although none of the animals showed any clinical signs of infection, the virus was found to persist in the blood for a few days in the case of all except *Cercopithecus mona* as determined by the injection of the blood into normal *rhesus*.

In addition, normal *Aedes aegypti* were fed on these monkeys and the mosquitoes which fed on *Cercopithecus tantalus* and *Cercocebus torquatus* within a few days of being injected with virus, were found to become infected and capable of transmitting the infection to susceptible *rhesus* monkeys. Experiments with *Erythrocebus patas* gave results suggestive of the mosquitoes having become infected, but since no fatal infection was produced by them, the results are not quite definite. Protection tests were made with the sera of four *Cercopithecus tantalus*, two *Cercocebus torquatus* and one *Erythrocebus patas* after these animals had been exposed to experimental infection. In every case the serum was found to have acquired protective properties, injections of 5 cc. protecting *rhesus* monkeys against large doses of the virus. The sera of five of these monkeys were tested before the experiment, and in every case had no protective properties. [On p. 169, September 18th, 1929 is presumably a misprint for September 8th.]

E. H.

Pettit (Auguste) & Stéfanopoulo (Georges). Fièvre jaune chez un singe du nord-africain, *Macacus innuus* L. [**Yellow Fever in a North African Monkey,** *Macacus innuus* L.]—*C.R. Soc. Biol.* 1930. May 9. Vol. 104. No. 15. pp. 63–65. [1 ref.]

A record of the infection of 3 *Macacus innuus*, by the inoculation of yellow fever virus. One animal died after 5 days and the other two after 4 days with typical symptoms of yellow fever, the pathological changes resembling those in *M. rhesus*. [It is interesting to note that during one of the yellow fever epidemics at Gibraltar, in 1828, the local monkeys, which belong to this species, are said to have died off in large numbers.]

E. H.

WAKEMAN (A. Maurice) & MORRELL (Clare A.). **Chemistry and Metabolism in Experimental Yellow Fever in *Macacus rhesus* Monkeys. I. Concentration of Nonprotein Nitrogenous Constituents in the Blood.**—*Arch. Intern. Med.* 1930. Aug. Vol. 46. No. 2. pp. 290–305. [29 refs.] [Lab. of West African Yellow Fever Commission, Internat. Health Division, Rockefeller Foundation, Lagos.]

The authors have studied various chemical changes accompanying yellow fever in monkeys. In common with previous observers they find extremely low blood sugar values, e.g., 14 to 28 mgm. per 100 cc. at the end of the infection. Blood creatinine was slightly increased during the course of the disease and there was also an increase in the absolute amount of urea nitrogen, although when calculated as a percentage of the total non-protein nitrogen there was a decrease. It is interesting, in view of the extreme necrosis of the liver in yellow fever, that there was no significant change in the uric acid concentration of the blood, for the removal of the liver in dogs and rabbits has been found to cause a rise in the uric acid content of the blood. The amino-acid nitrogen was found to rise rapidly in the terminal stages of the disease, and showed large gains both in absolute amounts and in relation to the total non-protein nitrogen. The absolute concentration of rest nitrogen was also increased. The functional derangement of the liver is evidenced by its loss of power to deaminize amino-acids and to produce urea, but this change becomes apparent only during the last hours of life.

The rapid terminal rise of blood non-protein nitrogen is considered to be due to failure of the renal function. The decrease in both urine volume and excretion of nitrogen may be associated with the fall of blood pressure usually occurring before death. In three monkeys tested by a manometer in the femoral artery the pressure fell from a normal of approximately 120 mm. of mercury systolic and 60 mm. diastolic, to as low as 50 to 60 systolic and 40 to 50 diastolic.

E. H.

VELLARD (J.) & VIANNA (M. Miguelote). Modificações da coagulação sanguinea no decurso da febre amarella experimental no *Macacus rhesus*. [**Modifications of Coagulability of the Blood in Experimental Yellow Fever in *Macacus rhesus*.**]—*Med. Inst. Oswaldo Cruz.* 1930. Vol. 23. No. 4. pp. 173–177. [2 refs.]

Sixteen rhesus monkeys were divided into three groups. Ten were inoculated with virulent blood from other rhesus, 3 were bitten by mosquitoes infected from man or rhesus, and 3 were inoculated with emulsions of infected mosquitoes. 5–10 cc. of blood were taken by cardiopuncture on successive days when the fever appeared. The serum showed no change of coagulability, so that of the plasma was studied. In no case was complete incoagulability observed, nor so small an amount of antithrombin as would definitely impede coagulation of a normal serum *in vitro*. Generally speaking, the diminution of coagulability varied with the degree of haemorrhage in this disease, but being only slight in non-fatal cases affords a good prognostic sign in monkeys. It is not applicable to man in whom the coagulability is disturbed in all cases from the onset of the fever.

H. H. S.

i. Manteufel (Paul) & Herzberg (Kurt). Identität des *Bacillus hepatodystrophicans* (Kuczynski 1929) mit dem *Bacterium renale cuniculi* (Manteufel und Herzberg 1929). [**The Identity of** *Bacillus hepatodystrophicans* **(Kuczynski 1929) with** *Bacterium renale cuniculi* **(Manteufel and Herzberg 1929).**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. June 3. Vol. 117. No. 1/3. pp. 16–18. [3 refs.] [Med. Acad., Dusseldorf.]

ii. Kuczynski (Max H.) & Hohenadel (B.). Bemerkungen zu der Arbeit von Manteufel und Herzberg: "Identität des Bacillus hepatodystrophicans usw" [Dieses Zbl. Abt. I Orig. 117, 16 (1930).] [**Remarks on the Work of Manteufel and Herzberg.**]—*Ibid.* July 28. Vol. 117. No. 7/8. pp. 499–500.

i. The authors have compared two strains of *B. hepatodystrophicans* (Nos. 312 and 1596) received from Professor Kuczynski, with *Bacterium renale cuniculi*, an organism which is often present in the kidneys of apparently healthy normal rabbits. The results of cultural and agglutination tests indicate that the two are identical, and it would seem that Kuczynski's yellow fever bacillus was derived from the rabbit's kidney used in making his culture media. When using culture media containing fresh tissue, it is evident that very great caution has to be used, for Manteufel and Herzberg obtained growth of *B. renale cuniculi* in media containing normal rabbit's kidney, that showed no signs of being infected until after 20 days' incubation period.

ii. In their reply the authors state that they have examined approximately 300 rabbits during the past two years, and as a general rule no bacterial infection was found in their organs. Moreover, the best results were obtained by the use of the heart or liver of monkeys infected with yellow fever, rabbit tissue never having been introduced into these culture tubes. Finally, attention is called to the results of their experiments which form the basis of the aetiological nature of *B. hepatodystrophicans*.

E. H.

Monteiro (J. Lemos). Nouvelle technique pour la préparation du vaccin contre la fièvre jaune. [**A New Method for the Preparation of Yellow Fever Vaccine.**]—*C. R. Soc. Biol.* 1930. June 20. Vol. 104. No. 21. pp. 695–697. [Butantan Inst., Butantan.]

The method of preparing this vaccine, in which the virus is inactivated by chloroform, was described in a previous publication [*ante*, p. 493]. The present article, in addition to giving details of the technique, contains particulars of two rhesus monkeys which were inoculated with this vaccine 24 hours and 3 days after its preparation. Three months later both were tested and found to be immune against yellow fever.

E. H.

Okell (C. C.). **Experiments with Yellow Fever Vaccine in Monkeys.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Aug. 8. Vol. 24. No. 2. pp. 251–254. [4 refs.]

A record of experiments with yellow fever vaccines prepared in accordance with Aragão's modification of Hindle's technique, 0·5 per cent. phenol and 0·02 per cent. formaldehyde being used to inactivate

the virus. Owing to the uncertain lethality of the virus it was impossible to prove conclusively that the vaccine protected the monkeys against yellow fever, but in the case of vaccines less than a month old there was a strong probability (0·9936) that they conferred protection, and in those more than a month old there was fairly conclusive evidence that they failed to protect. The virus employed was the French strain, used in HINDLE's experiments, and there is evidence of its diminution in virulence, for whereas HINDLE [this *Bulletin*, Vol. 26, p. 292] found that out of 60 monkeys inoculated with the virus all except one died of yellow fever, in the present series of experiments, out of 38 normal monkeys, only 21 died apparently from yellow fever and 17 recovered. This diminution in virulence is considered to be a likely cause of the failure to produce more adequate confirmation of previous observations as to the protective value of this vaccine, and, as the author remarks, unless a virus can be obtained which kills approximately 100 per cent. of monkeys, prophylactic effects can only be based on tests in which vaccinated and control animals are sufficiently numerous for the mortality figures of the two groups to be amenable to statistical analysis. None of the monkeys inoculated with the vaccine showed any indisposition that could be ascribed to this treatment.

E. H.

MONTEIRO (J. Lemos) & TRAVASSOS (J.). Diagnostico serologico da febre amarella. Sobre a reacção do fixação do complemento na febre amarella, seus resultados e valor pratico. [**Serological Diagnosis of Yellow Fever. Fixation of Complement, its Results and Value in Practice.**]—*Brasil-Medico.* 1930. Mar. 15. Vol. 44. No. 11. pp. 313–318. With 1 text fig. [2 refs.]

—— & ——. Diagnostic sérologique de la fièvre jaune. A propos de la réaction de fixation du complément dans la fièvre jaune : ses résultats et sa valeur pratique.—*C. R. Soc. Biol.* 1930. June 20. Vol. 104. No. 21. pp. 697–700. [1 ref.]

The authors describe their method of carrying out the complement fixation test for yellow fever.

As antigen they use the liver of an infected *M. rhesus* killed soon after the fall in temperature. The tissue is cut in small pieces, repeatedly washed in saline, then triturated with sand. To each gram of liver tissue 1 cc. of 10 per cent. NaCl is added, the whole placed in the cold for 24 hours in a sterile flask containing glass beads. The concentration of the saline is then reduced to 0·85 per cent., the product is thoroughly shaken for an hour, centrifuged or filtered and the filtrate distributed in sterile ampoules after testing for bacterial sterility. For the test 0·2 cc. of the serum and 0·2 cc. of the antigen are used with graded amounts of complement, the whole made up to 1·5 cc. and placed in a waterbath at 37°–38° C. for 1½ hours. The second part of the reaction is carried out in the usual way.

Tests were made : (1) With sera from yellow fever cases and convalescents ; excluding those which were anticomplementary, there were 11, and of these 9 were positive, 2 negative. (2) With sera of 25 infected *rhesus* ; 95·8 per cent. were positive after the fourth day of illness, and the intensity increased from the sixth to the tenth day. (3) Sera of patients suffering from typhoid and other febrile conditions, such as typhus and syphilis ; of these 14·5 per cent. were positive. In explanation of this it is stated that they were persons who had lived in an

infected area. (4) Individuals apparently in good health living in yellow fever districts ; of these 30 per cent. were positive. (5) Lastly, sera of 20 foreigners, recent arrivals in the country ; these were all negative. The test may thus be useful in determining among the inhabitants of an infected district those susceptible to infection and those who have acquired immunity.

It may be mentioned that the serum of patients or convalescents, when added to the antigen in equal quantities, gave a precipitation ; with less antigen or with normal serum no such reaction appeared.

H. H. S.

Aragão (Henrique de Beaurepaire). Transmissão da febre amarella pelos mosquitos.—*Brasil-Medico.* 1929. Dec. 7. Vol. 43. No. 49. pp. 1481–1484. [1 ref.]

Jorge (Ricardo). La fièvre jaune et la campagne sanitaire à Rio de Janeiro (1928–1929).—*Bull. Office Internat. d'Hyg. Publique.* 1930. Mar. Vol. 22. No. 3. pp. 477–501. With 2 diagrams. [1 ref.]

Monteiro (J. Lemos). Recherches de microorganismes dans le sang de *Macacus rhesus* infectés avec le virus amaril.—*C. R. Soc. Biol.* 1930. June 20. Vol. 104. No. 21. pp. 701–703. [2 refs.]

Régis (L. J.). Les idées actuelles sur la fièvre jaune.—*Rev. Prat. Malad. des Pays Chauds.* 1930. Jan. Vol. 10. No. 1. pp. 9–10, 13–17.

MEDICAL ZOOLOGY.

i. Blacklock (D. B.), Gordon (R. M.) & Fine (J.) with a Bacteriological Investigation by Watson (Marion). **Metazoan Immunity: a Report on Recent Investigations.**—*Ann. Trop. Med. & Parasit.* 1930. Apr. 7. Vol. 24. No. 1. pp. 5–54. With 7 text figs. & 3 graphs. [9 refs.] [Sir Alfred Lewis Jones Research Lab., Freetown, Sierra Leone.]

ii. Watson (Marion). **Bacteriological Investigation on** *Cordylobia anthropophaga* **in Relation to the Immunity produced by it.**—*Ibid.* pp. 55–67. [3 refs.]

i. In two earlier papers (1927; see this *Bulletin*, Vol. 24, p. 861, and Vol. 25, p. 252) the authors in Sierra Leone showed how in guineapigs, after previous experimental infection with the parasitic maggot of the tumbu fly (*Cordylobia anthropophaga*), the plot of skin invaded by the maggot acquires an immunity to a subsequent infection, this local skin-immunity tending to spread from the primary focus to neighbouring areas that have not been invaded by the maggot. They also observed that guineapigs of the local breed (which presumably had at times been attacked by the parasite) are much less susceptible to experimental infection than guineapigs imported from England. Furthermore, they obtained some success in the artificial production of immunity by allowing young Cordylobia larvae to pierce the skin and then removing them, and also by the application of emulsions of the larvae to the skin.

In the present paper the authors, after confirming the easy and certain development of this local skin-immunity following an invasion of the living parasite, describe the difficulty and uncertainty of producing it by injections of the dead parasite or by intracutaneous vaccinations of antigens prepared from its various tissues and juices. Of 40 animals (guineapigs and rats) submitted to such preventive treatment for terms of considerable length 23 survived for further experiment, and although many of these 23 showed a "relative immunity" (or lessened susceptibility) only 3 developed complete local immunity. Of these 3 animals, 1 received 230 first instar larvae in 5 injections in the course of 32 days; 1 received the ground-up cuticle of 42 third instar larvae in 6 injections in the course of 30 days; and 1 received 521 first instar larvae in 5 injections in the course of 28 days. This discrepancy between the certainly immunizing consequence of an invasion by the living larvae and the uncertain and exceptional vaccinating results of large quantities of dead larvae and of antigens prepared from dead larval tissues has stirred the authors to a careful and elaborate physiological study of the Cordylobia larva—of which the following is their own summary:—

"1. Injections of whole first instar *Cordylobia anthropophaga* larvae and antigens prepared from the cuticle, salivary glands and gut of third instar larvae have only produced immunity in a few isolated instances and then only after the injection of relatively very large amounts of such antigens. The toxicity of these antigens and the development of immunity to such toxins has been studied.

"2. The following enzymes have been found to occur in the third instar larva:—Amylase, invertase, maltase, trypsin, erepsin, lipase and tyrosinase; an account is given of their distribution and relative concentration.

" 3. Immune and non-immune guineapigs' sera were found to possess both amylase and lipase. In a few experiments the presence of an invertase accelerator was also demonstrated.

" 4. Neither immune nor non-immune animals showed any anti-enzyme to amylase, invertase, or lipase. Both immune and non-immune animals possessed to an equal extent anti-trypsin and anti-tyrosinase.

" 5. Injection of amylase, invertase, and lipase into guineapigs was not followed by the development of an anti-enzyme. Injection of tyrosinase (i.e., the haemocoele fluid of third instar larvae containing both tyrosinase and tyrosin) into guineapigs did not increase the already existing anti-tyrosinase.

" 6. Injection of trypsin into guineapigs was followed by the further development of anti-trypsin, but animals which had acquired this antibody possessed no immunity to Cordylobia larvae.

" 7. The power possessed by third instar larvae of resisting long periods of oxygen deprivation has been studied. We have reached the conclusion that this power is dependent on the enzyme tyrosinase present in the haemocoele fluid of the larva. Our experiments have confirmed and amplified the work of Barnes and Grove (1916).

" 8. Eosinophilia followed the injection of the haemocoele fluid or excreta of third instar larvae into guineapigs. A similar result did not follow the injection of whole first instar larvae, or of antigens prepared from the cuticle, salivary glands or gut of third instar larvae.

" 9. No precipitin in the serum of previously infected animals could be demonstrated to antigens composed of ground first instar larvae or of cuticle, salivary glands or gut of third instar larvae. The injection of large amounts of these antigens only rarely led to the development of a weak specific precipitin.

" 10. A precipitin has been shown to exist in the serum of previously infected animals to the haemocoele fluid and excreta of third instar larvae. No such precipitin was ever demonstrated in the serum of animals which had not been infected.

" 11. The death of the larva in the immune animal has been shown to be very closely associated with the reaction between the gut contents of the larva and the serum of the immune animal."

ii. This investigation opens an attempt to elicit what part, if any, is taken by bacteria in the production of the immunity to the attack of the Cordylobia larva observed in guineapigs as a consequence of repeated infection. In the case of both guineapigs and rats, it states the number of organisms isolated from their skins, the distribution of the organisms (identified and at present unidentified) among the normal and the immune animals ; and also states the distribution of organisms isolated among ten new-hatched flies and among ten third instar Cordylobia larvae. The author's conclusions, so far, are as follows :—

" 1. That in the two groups of guineapig skins examined, the bacterial flora of the non-infected skins differed little from that of the immune skins, and further, that no one organism was constantly present and peculiar to one group or the other.

" 2. That the bacterial flora of the rat skins examined, although less varied than that of the guineapig skins, did not differ materially from the latter.

" 3. That the newly emerged *C. anthropophaga*, hatched under sterile conditions, contains organisms similar to those isolated from the intestinal tract of third instar larvae.

" 4. That third instar larvae of *C. anthropophaga* have intestinal tracts containing many bacteria, and that the organisms probably are derived largely from the skin or tissues of the host in which they have grown.

" 5. That the first instar larvae of *C. anthropophaga*, on emergence from the eggs, are sterile.

" 6. That the interior of the eggs of *C. anthropophaga*, laid by flies which have been bred without any precautions to ensure sterility, is sterile."

A. Alcock.

SERGENT (Edm.). De la prémunition. [**On "Premunition."**]—*Bull. Soc. Path. Exot.* 1929. Dec. 11. Vol. 22. No. 10. pp. 887–895. [Pasteur Inst. of Algeria, Algiers.]

Certain infectious diseases are not submissive to vaccination; such as tuberculosis, undulant fever, glanders, syphilis, malaria and maladies due to protozoa generally; and yet by their chronic persistence in a dormant state they give to the individual a protection from a fresh infection which resembles the immunity established by recovery from a disease that is tractable to vaccination. For this semblance of vaccinal immunity—lasting, however, only as long as the original infection continues latent—Ed. Sergent has coined the word "premunition," and for the living dormant virus in its protective rôle he uses the term "virus-vaccine." The state of "premunition" is exemplified in "old colonists, long-time carriers of the germs of malaria, who know that they do not run the same risk of a pernicious attack as the new-comer does," "Premunition," it is explained, corresponds with "relative immunity" of the Germans, "immunity-tolerance" of MESNIL, "partial immunity" of BORDET, and "labile immunity" of C. SCHILLING.

Can we imitate and artificially provide this "premunition"—so well exemplified in the latent malaria of the old colonist—against other infectious diseases not amenable to vaccination? Can we run all the risks of using for weal or woe a living natural virus as a vaccine—of damaging the individual, of broad-casting "carriers," of manufacturing "reservoirs"? The question for the medical man is humanitarian, for the veterinarian mainly economic. Where the virus can be cultivated its virulence may be mitigated in the course or modified circumstances of cultivation; in this way the B.C.G. premunitive "virus-vaccine" of CALMETTE & GUÉRIN has lost its virulence entirely. In the case of diseases due to Haematozoa their course may be aborted or suddenly mitigated by appropriate therapeutic treatment which does not actually sterilize the blood; in this way, in N. Africa, camels are "premunized" against trypanosomiasis by inoculating them with the specific trypanosome and then aborting the fever by an injection of an antimony or arsenic product. [If the B.C.G. vaccine should be embraced in the definition of "premunition" it would seem that the famous anthrax vaccine of PASTEUR should also be included.]

A. A.

EMILY (J.). Un centre d'études biologiques en Afrique occidentale française "Pastoria." [**Pastoria: a Centre of Biologic Studies in French West Africa.**]—*Presse Méd.* 1930. Mar. 5. Vol. 38. No. 19. pp. 323–325. With 6 text figs.

This is a general account of "Pastoria," the park and menagerie for apes and monkeys established about seven years ago in the island of Los, near Konakri, in French West Africa, mainly for the experimental study of certain communicable tropical diseases. The scheme of the institution originated, just before the War, with CALMETTE. It was

well supported by the Pasteur Institute of Paris and was liberally furthered by the French West African Government ; but it could not be brought into reality until the end of 1922. The scientific objects and the happy organization of the institution have been described by CALMETTE himself (1924) in a paper entitled " Sur l'utilization des singes en médecine experimentale. Le Laboratoire Pasteur de Kindia (Guinée Francaise) " which was summarized in this *Bulletin* (Vol. 21, 1924, p. 672). The object of Emily's paper is to attract the attention of the general medical public to the existence of the institution and its staff and to the universal interest of some of its activities.

A. A.

KURAUCHI (K.). **The Wild Rodents of Inner Mongolia. Plague Studies 2.** —*Jl. Oriental Med.* 1930. May. Vol. 12. No. 5. [In Japanese. English summary pp. 46–47.] [Hyg. Inst., S. Manchurian Rly. Co., Dairen.]

A collection of 57,178 rodents and 37 specimens of a hedgehog, all named by Prof. MORI, of Keijo Medical College. Of rodents, the commonest by far is *Mus wagneri* ; other Muridae are *Rattus decumanus* and *R. alexandrinus* (neither of them numerous), *Mus minutus*, *Apodemus agrarius*, *Cricetus fumatus* (a hamster), Microtus (vole), new species of Meriones and Phodopus; of Sciuridae, *Citellus mongolicus* and a new species of sousliks ; of jerboas, *Alactaga mongolica* ; of molerats, *Myospalax epsilanus*. Of 8,158 sousliks examined 36 were infected with plague.

A. A.

FAUST (Ernest Carroll). **A Study of the Intestinal Protozoa of a Representative Sampling of the Population of Wise County, Southwestern Virginia.**—*Amer. Jl. Hyg.* 1930. Mar. Vol. 11. No. 2. pp. 371–384. With 4 text figs. [6 refs.] [Med. College, Tulane Univ., New Orleans.]

In exceptionally favourable circumstances for collection and examination of material the author examined specimens of faeces (the majority less than 24 hours old) of 460 individuals (95 per cent. White) of the native population of Wise county in Virginia. Three preparations were made from each sample. Of the 460 individuals, 43·9 per cent. were male and 56·1 female ; 21·1 per cent. were between a month and 5 years ; 51·5 between 6 and 15 years ; 9·5 between 16 and 25 years ; 8·4 between 26 and 35 years ; and 9·5 were 36 years or more. Of the 460, no less than " 55·9 per cent. were positive on the one-examination basis for at least one of the human intestinal protozoa. The respective percentages of positives for the entire group are as follows : *Entamoeba coli*, 26·1 ; *E. histolytica*, 20·0 ; *Endolimax nana*, 26·5 ; *Iodamoeba buetschlii*, 6·1 ; Giardia, 16·3 ; Chilomastix, 5·0 ; Trichomonas, 2·4." From the data elaborated and analysed, the following conclusions are established :—

That " with the exception of Giardia, which is primarily an infection of childhood, there is a definite increase in the percentage incidence of these protozoa from childhood to middle age, indicating an accumulation of these infections year by year and an essential lack of immunity to them. The pro-rating of these infections to a six-examination basis shows an intensive-

ness of infection in the Wise county area which is comparable only with that observed in surveys in tropical countries and in SVENSSON's mental asylum cases in Sweden. There appears to be no correlation between protozoan and Ascaris infections in the groups studied."

A. A.

GABALDON (Arnoldo). Nota sobre distribucion de protozoos intestinales basada en el examen de 2,000 muestras. [**The Distribution of Intestinal Protozoa as shown by Examination of Two Thousand Specimens of Faeces.**] Trabajo presentado como tesis a la Universidad Central de Venezuela para el Doctorado en Medicina.—44 pp. 1930. Tipografía Americana, Caracas-Venezuela.

This was a thesis for the M.D. Venezuela. Smears from fresh stools (8–12 hours old) were examined in saline, or saline and eosin, or a solution of iodine. The stools, it must be explained, were brought by persons wishing to know whether they harboured parasites, and since more than one might be from the same individual, the record is based merely on samples, and not on individual subjects.

E. histolytica [no distinction between vegetative or cystic] was found in 8·9 per cent., most between 3 and 5 years, none under 1 year and only 3·3 per cent. of the positive over 40 years. It was present with *E. coli* 25 times. The latter alone in 9·4 per cent., and one fifth of those in young people between 6 and 20 years. *Iodamoeba bütschlii* in 4·6 per cent., most in those from 6–10 years, *Endolimax nana* in 4·8 per cent., *Chilomastix mesnili* in 7·5 per cent., *Giardia lamblia* in 9·4 per cent., nearly one third of the last in children below 2 years. *Balantidium coli* in 5 persons only, all between 21 and 40 years, 3 men and 2 women. [Tables are drawn up for each of these parasites to show the percentage distribution in age groups : these figures however have not been reproduced here in detail because in the majority the total number of occasions on which they were present would be less than a hundred, making percentage deductions misleading.]

H. H. S.

HAKKI (Ismaïl). Le parasitisme intestinal en Turquie. [**Intestinal Parasitism in Turkey.**]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 192–196.

This appears to be a supplement to a paper by the author (who is Professor of Parasitology in Constantinople) which was published in the *Annales de Parasitologie*, April 1st, 1928. Of 600 individuals (men, women and children) whose fresh stools were examined, 350 harboured intestinal parasites. The protozoa present, and their percentages, were *Entamoeba dysenteriae* (cysts) 3·8 ; other 4-nucleate amoeba-cysts, 8·2 ; *Giardia intestinalis*, 4·0 ; *Tetramitus mesnili*, 2·0 ; *Trichomonas hominis*, 2·5. Intestinal worms or their eggs were found in 348 cases, the genera represented being Ascaris, Enterobius, Necator, Trichuris, *Taenia* (*saginata*), Hymenolepis, Dipylidium, and Diphyllobothrium ; of the worm infestations 272 were of a single species, 50 were of two, 23 were of three, and 3 were of four species ; eosinophilia was observed in 75 per cent. of these infestations.

A. A.

Paulson (Moses) & Andrews (Justin). **The Incidence of Human Intestinal Protozoa in Duodenal Aspirates.**—*Jl. Amer. Med. Assoc.* 1930. June 28. Vol. 94. No. 26. pp. 2063–2065. [14 refs.] [Johns Hopkins Hosp. & School of Med., & School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Seventeen persons presenting no evidence of gastro-intestinal or hepatobiliary disease, but passing (collectively) in the faeces all the commoner forms of intestinal protozoa (Endolimax, Entamoeba, Iodamoeba, Chilomastix, Embadomonas, Giardia, Trichomonas) were subjected to duodenal drainage, by a process fully described, for the purpose of ascertaining what protozoa are to be found in the duodenum, upper jejunum, and possibly in the bile-ducts and gall bladder. The results showed that only *Giardia lamblia* lived in the duodenum ; it alone occurred in the duodenal juice in all the cases (7), where it was found alone or in association in the faeces ; in all the other (10) cases, where it was not found in the faeces, the duodenal juice was quite barren of protozoa. The authors conclude that the presence of Giardia in " duodenal aspirates " containing bile does not establish the proposition that it lives in the gall bladder.

A. A.

Ratcliffe (Herbert L.). **A Method for obtaining a Breeding Stock of Rats Free from Intestinal Protozoa.**—Reprinted from *Science.* 1929. Sept. 20. Vol. 70. No. 1812. pp. 286–287. [3 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The method here described is the outcome of the author's observation that protozoa did not make their appearance in the intestines of young rats until the age of 20 to 25 days, when they began solid food. He therefore took 15 seventeen-days-old rats from their mothers, put them in a clean cage, fed them at first, for two days, willy-nilly, on warm solutions of milk-powder, and thereafter on a stock ration (whole-wheat flour 60, whole-milk powder 15, unpurified casein 15, butter 5, Ca carb. 2, Fe cit. 2, NaCl. 1, green stuff, and water) with an eye to maintaining a stock free from intestinal protozoa. Of 11 that survived weaning 5 were killed when 4 weeks old, and 6 when 8 weeks old ; protozoa were not found in intestines and caecum of any. The experiment was repeated with 8 young rats, all of which were killed at 8 weeks, with the same result. It was repeated again with 8, including 5 females ; and at the age of 12 weeks material taken from the caecum of each was apparently not infected. They lived on and bred, and half the young from the first litters were killed and examined when weaned —and " were found to be uninfected."

A. A.

Carpano (M.)., Pluralité des virus dans les infections par hémoprotozoaires et valeur de l'immunité croisée dans la création de nouvelles espèces. [**Plurality in the Virus of Haemoprotozoon Infections, and the Value of Cross Immunity in the making of New Species.**]—*Ann. Parasit. Humaine et Comparée.* 1930. Jan. 1. Vol. 8. No. 1. pp. 1–7. With 1 text fig.

In discussing the validity of " biological species," and the value of cross-immunity as an experimental basis, the author dwells on the

snares that beset them. On the one hand, there may be plurality in the virus, and there is variability in its virulence. On the other hand, in the individual animals there have to be considered amplitude of immunity, natural resistance (variable), and possibility of latent infections. As instances the author refers to certain strains of *Nuttallia equi*, *Babesia bovis*, and *Piroplasma bigeminum* fatal to animals that had acquired their respective immunity in a different locality.

A. A.

Clark (Herbert C.) **A Preliminary Report on Some Parasites in the Blood of Wild Monkeys of Panama.**—*Amer. Jl. Trop. Med.* 1930. Jan. Vol. 10. No. 1. pp. 25–32. With 5 plates. [6 refs.]

The author found malaria parasites in two kinds of Cebid monkeys captured in Panama during July—a species like *P. vivax* in red spider-monkeys (*Ateles geoffroyi*) and a species like *P. malariae* in capuchins (*Cebus capuchinus*). In both cases nearly all the infected individuals were " infants," or young, or pregnant females, and in both cases enlargement of the spleen and deep pigmentation of viscera was to be observed. Inoculations of an Old World monkey, *Macacus rhesus*, with the infected bloods gave no result—no parasites nor any signs of illness were observed within an observation term of six weeks.

Individuals both of Ateles and Cebus, as also of the Titi monkey (*Saimiri oerstedii*), were infected with microfilaria. Cebus and Titi monkeys, as also black howling monkeys (*Alouatta palliata*) were infected with trypanosomes, but their blood did not prove infective to guineapigs within a term of six weeks.

A. A.

Glaser (R. W.) & Coria (N. A.). **Methods for the Pure Culture of Certain Protozoa.**—*Jl. Experim. Med.* 1930. May 1. Vol. 51. No. 5. pp. 787–806. With 2 figs. on 1 plate. [14 refs.] [Rockefeller Inst. for Med. Research, Princeton, N.J.]

The artificial cultivation of protozoa is often hampered by growths of bacteria and yeasts ; and the authors describe in detail their methods of " purifying " media from this kind of contamination—such as the use of dilute media poor in proteins. Or, where two species develop from the same inoculum, they may be separated by further dilution and washing, taking advantage of a negative geotropism that brings protozoa to the surface. Or, again, where a species cannot be purified from bacteria by other methods, chemical sterilization can be employed. Among other (identified and unidentified) species successfully purified was *Paramecium caudatum*, but it failed to develop subsequently since it feeds on living micro-organisms. The paper cannot be further abstracted, since it consists chiefly of descriptive technique.

A. A.

Faust (Ernest Carroll). **Experiments on the Effect of Di-Hydranol on Intestinal Protozoa of Man and Laboratory Mammals.**—*Proc. Soc. Experim. Biol. & Med.* 1930. June. Vol. 27. No. 9. pp. 905–907. [4 refs.] [Dept. of Trop. Med., Tulane Univ., New Orleans.]

The author records experiments with di-hydranol (2–4 dihydroxyl-phenyl n-heptane) in the treatment of intestinal infestations of protozoa in 21 human cases and 13 animals. " In 19 cases of *E. histolytica* including 2 acute infections (dogs), 1 chronic case of 5 years' standing and refractory to other drugs (adult), 2 chronic children, and 14 carrier cases, all except one carrier case have been freed of the infection with a single course of treatment (4 to 10 gm.).

Two of the 12 *E. coli* infections have been eliminated. The 2 Iodamoeba and 2 *Endolimax nana* infections have been removed. The 2 Trichomonas infections (monkeys) have been eliminated. One of the 3 Chilomastix [monkeys] and 4 of the 14 Giardia cases (2 human, 2 canine) have been eliminated. The rest were completely freed of their Giardia infection on the third day of treatment, but gradually showed Giardia cysts in their stools "—a possible re-infection from their cages. The results suggest that di-hydranol has a specific effect on *E. histolytica*, *E. nana*, Iodamoeba, and Trichomonas, but is less punitive to tough-walled cysts.

The course of treatment lasts for 7 days (or more), to a total of 4 to 10 gm. of the drug. Children get 0·2 gm. three times a day in a teaspoon of olive oil, for 7 days ; adults two capsules each containing 0·3 gm. two or three times a day, after meals. The drug was well borne, except for slight gastric pain in two children to whom it had been given before meals, and for slight diarrhoea in the case of two adults.

A. A.

Ratcliffe (Herbert L.). **The Oral Administration of Certain Alkyl Resorcinols and their Effects upon the Intestinal Protozoa and Bacteria of Rats and upon Intestinal Protozoa in Chicks.**—*Amer. Jl. Hyg.* 1929. Nov. Vol. 10. No. 3. pp. 643–654. [9 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

One per cent. of, respectively, butyl-, hexyl-, heptyl-, and octyl-resorcinol was added to the diet of certain groups of rats (the diet being one that normally excites a predominance of Lactobacillus). All the rats were infested with *Trichomonas muris*, *T. parva*, and *Entamoeba muris*. At the end of 15 days *T. muris* and *Ent. muris* were " absent in all cases," and Gram-positive bacteria were " practically absent " and Gram-negative predominant in the material from the caeca. (By butyl- and hexyl-resorcinol *T. parva* had been reduced only to about 10 per cent. of the original number, though the other two resorcinol derivatives appear to have been completely effective against *T. parva* in 4 cases). Two groups of chicks, infested respectively with *Trichomonas gallinarum* and *T. hominis* were completely freed from these organisms in five days by a diet containing 1 per cent. of heptyl-resorcinol. The experiments were adequately controlled throughout.

A. A.

Cleveland (L. R.) & Sanders (Elizabeth P.). **Encystation, Multiple Fission without Encystment, Excystation, Metacystic Development, and Variation in a Pure Line and Nine Strains of** *Entamoeba histolytica*.—*Arch. f. Protistenk.* 1930. Vol. 70. No. 2. pp. 223–266. With 8 text figs. & 114 figs. on plates 7 to 13. [28 refs.] [Med. School, Harvard Univ., Boston.]

The complete text and the illustrations of this paper must be studied. From 8 cases of acute dysentery in Boston, and from one carrier, 9 strains of *Entamoeba histolytica* were isolated for the basis of this study. The cultivation of these 9 strains was studied in Boeck-Drbohlav and other modified media. That this and other good modifications sometimes came short of expectations was due to the concurrent growth of bacteria. The supreme modification, in which all the strains grew well, was found to be autoclaved slants of liver-infusion agar (prepared

by the Digestive Ferments Company, Detroit, Michigan) covered with horse-serum in saline (1–6) with a 3 mm. loop of sterile rice-flour added to each tube. In it " the amoebae become as numerous as blood-cells are in the blood-stream. It is impossible to convey to the reader just how abundantly the amoebae grow in this medium." So well do they grow that there is no difficulty in establishing a clone or pure line of progeny descended from a single cyst. " Most of the illustrations [of this study] are pure line, and every amoeba that has been drawn has been seen in the pure line." The virulence of the pure line was found to be about the same for kittens as other strains of corresponding length of culture ; it was tested by inoculations both per rectum and into the liver.

Variations in size of pure line cysts and amoebae and in the structure of the pure line nucleus are described. In the nuclei variations occur from the typical *histolytica* nucleus to what Kofoid and Swezy have described as " *Councilmania dissimilis* " and " *Karyamoebina falcata.*" "When the amoebae are fixed in Schaudinn's fluid at 37°C. perhaps not more than 1 to 2 per cent. of them have anything but *histolytica* nuclei. But when this same fixative [is used] at 60° C., . . . 5 to 10 per cent. have typical ' *Councilmania dissimilis* ' nuclei, and from 1 to 5 per cent. have typical ' *Karyamoebina falcata* ' nuclei ; from 5 to 10 per cent. have fairly typical *histolytica* nuclei, and the remainder, or from 60 to 80 per cent., have nuclei intermediate between *E. histolytica* on one hand, and ' *Councilmania dissimilis* ' and ' *Karyamoebina falcata* ' on the other." Schaudinn's fluid heated to 60° C. is, as the authors state, the fixative used by Kofoid and Swezy in the production of " Councilmania " and " Karyamoebina." These facts lead the authors to approve Wenyon's suggestion that " *Councilmania lafleuri* " may very well be a non-typical *E. coli* ; to suggest, furthermore, that " *Councilmania tenuis* " is probably a race of *E. histolytica* poor in chromatin ; and to conclude that " Councilmania " and " Karyamoebina " are not valid.

In the study of encystation, excystation, and metacyclic development, the authors' observations agree very closely with those of Dobell (see this *Bulletin*, Vol. 26, pp. 795, 796). In addition to 4-nucleate cysts 8-nucleate cysts sometimes (about 1 per cent.) occur in cultures—they are the product of binucleate amoebae. The authors have observed multiple fission of motile amoebae without encystment—everything goes on as in encystment except the formation of a cyst wall. They have also observed the ingestion and also stages of digestion of cysts (" cannibalism ") by active amoebae. Having been able to grow countless millions of amoebae and to make permanent preparations " perhaps a hundred times as rich in amoebae as preparations from faecal smears " they have had good opportunities of studying mitosis, and their observations of the process agree very closely with those of Dobell.

A. A.

Hindle (Edward). **Attempts to infect Hamsters with Various Flagellates.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. June 30. Vol. 24. No. 1. pp. 97–104. [16 refs.] [Wellcome Bureau of Scientific Research, London.]

This is a careful and critical paper, and to be appreciated must be read in full. Its recorded " experiments with hamsters, animals

peculiarly susceptible to infection with leishmania, support the generally accepted view that ordinary insect flagellates do not survive in vertebrates, unless they represent a stage in the development of a vertebrate parasite" ; and its other records do not countenance the theory that lizards may serve as reservoirs of leishmaniasis of man.

The author started with a sub-culture-variation of the flagellate stage of Chinese kala azar. (The original strain was stated to have been normal when isolated, but to have undergone modification in the course of subculture). Of 12 hamsters inoculated *in peritoneo* with a rich suspension of these modified culture-flagellates only one became infected—and this mildly, and after a second inoculation at an interval of six months.

Subsequently 11 hamsters were inoculated with cultures of a Leishmania from the blood of a gecko lizard ; 6 with cultures of a flagellate from the blood of an agamid lizard ; 6 with cultures of *Herpetomonas culicidarum* (from two different sources) ; and 6 with a species of Leptomonas straight from the crop and midgut of a large Pentatomid bug. In not one instance did any evidence of infection follow.

A. A.

VAN GOOR (J. M. Noothoven). Bijdrage tot het vraagstuk der beteekenis van *Lamblia intestinalis* voor de menschelijke pathologie. [*Lamblia intestinalis* **and its Importance in Human Pathology.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. Nov. 30. Year 73. 2nd Half. No. 48. pp. 5557–5568. With 3 figs. on 1 plate. [32 refs.]

A discussion on six cases showing the cholecystoduodenal syndrome with the presence of Giardia in faeces and in the duodenal bile tube. Although there was an increase of Giardia in the bladder bile after introduction of $MgSO_4$ or after injection of pituitary extract, the bile never contained inflammatory products and sections of an excised gallbladder did not show any pathological changes.

A review of the literature shows that only in two cases was Giardia actually demonstrated in sections of gallbladder, and in the one case of Westphal no pathological changes could be shown in the gallbladder wall. The author therefore doubts whether Giardia ever causes morbid changes in the biliary tract and he thinks that the mere increase of this flagellate in the bladder bile should not sanction cholecystectomy. This increase when occurring after injection of pituitrin can be explained as being brought about by the stimulating effect of the hormone on duodenal peristalsis and the consequent ejection of the flagellates into the duodenal lumen. The author also states that there is no evidence in literature of pathological changes in the duodenum produced by Giardia.

H. Lwow.

MORENAS (L.). La giardiose des voies biliaires. Étude critique. [**Giardiasis of the Biliary Tract. A Critical Study.**]—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 201–214. [36 refs.]

A historical account and bibliography of giardiasis of the bile-tract. The author's conclusions are that the invasion of the bile-tract by Giardia is a well-established fact, and that it is possible that such invasions on a large scale may provoke reflex irritation simulating various pathological

states and may even predispose the bile-ducts and gall-bladder to chronic infections. Furthermore, the invasion of the gall-bladder by Giardia is an established fact; but it probably is fortuitous and transient; at any rate the gall-bladder cannot be regarded as a "reservoir of the virus," nor has the occurrence of cholecystitis directly due to Giardia been proved.

A. A.

Donayre (Alberto). Algunas manifestaciones clínicas de sede digestiva producidas por el tricomonas. [**Digestive Disturbances associated with Trichomonas Infection.**]—*Crónica Méd.* Lima. 1930. Mar. Vol. 47. No. 801. pp. 57–68. [9 refs.]

Six cases of trichomonas infestation are described, some resembling dysentery, others appendicitis. Escomel's treatment by turpentine orally and iodine per rectum was entirely effective in all. [One of those with the appendicular syndrome may have been a case of catarrhal inflammation.]

H. H. S.

Ratcliffe (Herbert L.). **The Comparative Adaptability of** *Trichomonas muris* **and** *Trichomonas parva* **to Culture Media and to Changes in the Intestinal Flora of Rats.**—*Amer. Jl. Hyg.* 1929. July. Vol. 10. No. 1. pp. 63–77. [10 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Three species of Trichomonas have been described from laboratory rats, namely, *T. muris*, *T. minuta*, and *T. parva*. "But some doubt has been expressed as to the existence of more than one species (Wenyon 1926)." On the ground that *T. muris* has not developed in cultures where *T. parva* grows readily, and is quickly affected by changes in the intestinal flora by which *T. parva* "is not influenced to any great extent," the author assumes "that *T. muris* is a much more specialized organism than *T. parva*" and is a species distinct. [Kipchidzé in his paper on the cultivation of *Trichomonas elongata* (*infra*) notices that the shape and longevity of this species in cultures varies with the quality of the medium.]

A. A.

Ratcliffe (Herbert L.). **The Effects of Changes in the Diet and Intestinal Conditions of Rats upon Infections with** *Trichomonas hominis* **and** *Pentatrichomonas ardindelteili.*—*Amer. Jl. Hyg.* 1930. Jan. Vol. 11. No. 1. pp. 159–167. [6 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The aim of the experiments here described in all detail was to follow the connexion between certain intestinal flagellates and different types of intestinal bacteria. Having obtained rats believed to be trichomonad free the author infected 15 of them with *Trichomonas hominis* and 15 with *Pentatrichomonas ardindelteili*. Ten of both lots of rats were then fed for three successive terms, each of two weeks, on a succession of three different diets; and five of both lots, as controls, were fed on only one of the diets unchanged all the time. At the intervals between the twenty days the contents of the caecums of the rats were examined. Infections with both species of trichomonads were constantly light in the rats kept on the unchanged diet—one that promoted growth of Gram-positive bacteria; with a diet promoting Gram-negative bacteria they decreased, probably from increased acidity of the caecum; and with a diet leading to an increase of proteolytic bacteria they decreased still further. All the diets used had a high protein content it is to be noted.

A. A.

Kipchidzé (N.). Recherches sur la culture de *Trichomonas elongata.* [**On the Cultivation of** *Trichomonas elongata.*]—*Bull. Soc. Path. Exot.* 1930. Feb. 12. Vol. 23. No. 2. pp. 216–222. [5 refs.]

The Trichomonas found by the author and a collaborator in the mouth of *Macacus rhesus* and *Papio sphinx* is here stated to be identical with *T. elongata* from the human mouth. Various methods of cultivating the creature are here described; most of them have clotted horse-serum as a solid base and Ringer's solution or normal saline as a pallium, with perhaps some nutritive adjuvant. The medium affording the longest-lived culture (14 days) and the largest individuals is one having nutritive jelly as a base, and Ringer's or normal saline solution, with very finely powdered (sterilized) beef or fish-muscle and rice flour. The formulated detail of the paper cannot be abridged.

A. A.

Bishop (Ann). **The Action of Hydrochloric Acid upon Cultures of** *Trichomonas.*—*Parasitology.* 1930. Mar. Vol. 22. No. 2. pp. 230–241. [21 refs.] [National Inst. for Med. Research, Hampstead, London.]

Prior work—specified in the bibliography—is briefly reviewed. Sources of material used for experiment are stated, namely: *a*, Trichomonas from human faeces; *b*, Trichomonas from *Macacus nemestrinus*; *c*, Trichomonas from *Macacus rhesus*. Experiments are described and discussed; they show that the *rhesus* strain was the most susceptible, being killed after five minutes exposure to N/20HCl at 37° C., and being slightly affected by distilled water: but that under the same conditions the human and the *nemestrinus* strains might survive the action of the dilute acid and always survived the exposure to distilled water. At room temperature the survival of the trichomonads was much longer than at 37° C. The trichomonads could not withstand drying.

A. A.

Perekropoff (G. J.). Zur Frage des Einflusses der parasitischen Darmprotisten (*Tetrachilomastix intestinalis*) auf die Dickdarmkatarrhe des Menschen. [**Influence of** *T. intestinalis* **on Colitis.**]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Nov. 30. Vol. 114. No. 7/8. pp. 483–488. With 19 figs. on 1 plate. [7 refs.]

The flagellate, regarded by the author as the cause of colitis, is described and illustrated in a plate of nineteen figures, which, though poor, are sufficient to show that he was dealing with a *Trichomonas*, probably *T. hominis*, and not with "Tetrachilomastix intestinalis," the existence of which is problematical.

C. M. Wenyon.

Nieschulz (Otto) & Wawo-Roentoe (F. K.). Infektionsversuche von Meerschweinchen mit *Trypanosoma lewisi.* [**Experimental Infection of Guineapigs with** *Trypanosoma lewisi.*]—*Ztschr. f. Parasitenk.* 1929. Oct. 12. Vol. 2. No. 2. pp. 294–296. [8 refs.] [Inst. for Infectious Diseases & Parasit., Utrecht.]

Detail of experimental infections of guineapigs with *Trypanosoma lewisi.* The trypanosomes multiplied at first and remained in evidence microscopically to the 13th day and by transmission to rats up to the 20th day, and then succumbed to the natural resistance of the guineapig. A mild infection was obtained up to 9 days in two passages through guineapigs. Infection was not enhanced by splenectomy.

A. A.

Missiroli (A.). Ricerche sui flagellati che si riscontrano nell' "Anopheles maculipennis." (**Researches on Flagellate Hosts in "Anopheles maculipennis."**)—*Riv. di Malariologia.* 1930. Mar.–Apr. Vol. 9. No. 2. pp. 111–119. With 17 figs. on 2 plates. [4 refs.] [English summary p. 205.]

In 16 of 700 specimens of *Anopheles maculipennis* (caught in the Roman Campagna (Fiumicino) and elsewhere) the author recently found flagellates—*Herpetomonas culicis* and Leishmania forms in the hindgut of 12, and Crithidia along with mammal blood in the midgut of 4. Sections showed some undergoing simple longitudinal fission, others appearing to undergo multiple (40 to sixty-fold) fission. The Crithidia is identified with that form of the sheep-trypanosome (*T. melophagum*).

H. H. S.

Nicolaew (B. P.) & Yakowlewa (W. W.). Le sort formes sexuées du *Plasmodium vivax* dans la cavité abdominale des Culex, Theobaldia et Aedes. [**Fate of the Sexual Forms of *Plasmodium vivax* in the Abdominal Cavity of Culex, Theobaldia and Aedes.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 9. pp. 577–581. With 1 text fig. [In Russian. French summary pp. 581–582.] [Antimalaria Station, Leningrad.]

The authors fed culicine mosquitoes—*C. pipiens*, *T. alaskensis*, *Aedes salinellus*—on patients infected with *Plasmodium vivax*, and from time to time took smears of the individual stomach-contents and compared them with smears taken from anophelines—*A. maculipennis*—simultaneously fed upon the same patient. The resulting observations are as follows :—

The non-sexual forms of the Plasmodium were digested in the culicine as quickly as in the Anopheles. The sexual forms ripened, pairing was accomplished, and subsequent development proceeded as far as the vermicule stage, just as in Anopheles ; but no penetration of the stomach-wall by the vermicule was observed.

A. A.

Huff (Clay G.). **The Effects of Selection upon Susceptibility to Bird Malaria in *Culex pipiens* Linn.**—*Ann. Trop. Med. & Parasit.* 1929. Dec. 31. Vol. 23. No. 4. pp. 427–442. With 2 text figs. & 2 plates. [8 refs.] [Med. School, Harvard Univ., Boston.]

This is an experimental study in pure biology. The methods and technical detail are described, and the results are tabulated and debated. That the blood of birds used for feeding the mosquitoes should be grossly infected is the basis of the argument, and how fully this essential point is satisfied, is to be seen in a marvellous photograph of the stomach of a mosquito fed on a control bird. The following is the author's own summary :—

"Selection in *Culex pipiens* in respect to its susceptibility or non-susceptibility to *Plasmodium cathemerium* (an avian parasite) has brought strong evidence in favour of the existence of 'susceptible' and 'non-susceptible' races in this species. Selection of progenies from infected mothers caused the number of infected individuals in a particular line to

increase rapidly in percentage. Selection from uninfected mothers caused a rapid decrease in the percentage of infected individuals in such a line.

"It is believed that this proof weakens somewhat our conception that specificity is immutable. The proof that susceptibility and non-susceptibility behave as hereditary characters within a species, opens the question of whether a so-called susceptible species may not be capable of engendering a non-susceptible race, and conversely the question—even more important—of whether a so-called non-susceptible race may not be able to produce a susceptible race."

A. A.

SCHUURMAN (C. J.) & HUININK (A. M. Schuurman-Ten Bokkel). **Bird-Malaria.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1929. Vol. 18. No. 3. pp. 469–497. With 18 coloured figs. on 1 plate. [44 refs.] [Med. Lab., Weltevreden.]

This is a long study of *Plasmodium precox*, which, after a review of the history of the nomenclature, the authors accept as the name of the parasite of the bird-malaria of much classical research. It includes also a summary of the classical literature of the subject. In a search for the occurrence of the parasite 15 species of birds were examined, 11 of which were wild species. The parasite, *P. precox*, was found only in the canary, the weaver-bird (*Ploceus manjar*), and the Java lark (*Mirafra javanica*). (Halteridium occurred in 2 species of Munia besides the Java sparrow, Trypanosoma in another Munia, and Leucocytozoon in the hen, but none of these is further considered). *P. precox* is redescribed in much detail. Transmission experiments are described at length both by direct transmission from bird to bird and by indirect transmission through *Culex fatigans*. Besides the canary strain *C. fatigans* was found to be an appropriate carrier of the Java lark strain of the parasite, and in it the weaver-bird strain also developed sporozoites: but after a certain (limited) number of passages through birds of other than their own natural host-species the gametes of both the Java lark and the weaver-bird strains were unable to complete their sexual cycle in *C. fatigans* though their non-sexual forms retained their infective virulence for the alien bird-host. In the studies of the progress of infections in birds the influence of: (*a*) a concomitant Halteridium infection; (*b*) of reticulo-endothelial blockade; and (*c*) of vitamin B deficiency, was included—but inconclusively.

A. A.

SERGENT (Edm.), SERGENT (Et.) & CATANEI (A.). Paludisme des oiseaux. Etude de *Plasmodium rouxi* chez son hôte vertébré. [**Study of *Plasmodium rouxi* in its Vertebrate Host.**]—*Arch. Inst. Pasteur d'Algérie.* 1929. June. Vol. 7. No. 2. pp. 165–180. With 5 graphs & 1 plate. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]

Plasmodium rouxi here described and figured is a parasite of Algerian sparrows. The young schizont (1 to 1·5μ) is variable in shape, but as it grows becomes characteristically quadrangular with a nucleus at least half as big as the protoplasm, the latter containing but 2 granules of pigment. Schizogony results in the formation of 4 merozoites, which generally lie at the angles of the schizont, and a single granule of pigment. The young gametocytes are rather deficient in chromatin, they grow larger than the schizonts and then become elongated with one end rounded and the other end often notched or beaked (*souvent en bec de flûte*); the grains of pigment exceed two in number. *P. rouxi* never displaces or embraces the

nucleus of the red blood cell. It is intensely pathogenous to canaries, 15 of 50 canaries experimentally infected dying. The infection is characterized by a long incubation, a slow and prolonged invasion of the blood, and a chronic duration which may be protracted (with recurrent parasite-relapses) for years.

A. A.

Andrews (Justin). **Excystation of Coccidial Oocysts in Vivo.**—Reprinted from *Science.* 1930. Jan. 10. Vol. 71. No. 1828. p. 37. [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

" The author has repeatedly carried out excystation in vivo " of coccidia cysts from several species of mammals by the technique he describes. A young starved rat is fed on a few drops of a concentration of the ripe oocysts in sweetened milk. An hour afterwards the rat is killed and its intestine is removed. By search at the various points where the intestine is distended with the milk all phases in excystation can be found, if the oocysts were normal.

A. A.

Boughton (Donald C.). **The Value of Measurements in the Study of a Protozoan Parasite** *Isospora lacazie* (**Labbé**).—*Amer. Jl. Hyg.* 1930. Jan. Vol. 11. No. 1. pp. 212–226. [14 refs.] [Zool. Dept., Univ. of Minnesota, Minneapolis.]

The average size of the oocysts of the sparrow coccidian (*Isospora lacazie* Labbé) varies during an infection in an individual host. The variation " in general seems to progress through a period of about a month, from larger to medium to smaller mean sizes," including differences greater than those that have been used to differentiate coccidian species. " The observations can be explained by assuming that either the sparrows harbour several species or strains of the parasite or that some factor or group of factors brings about a considerable change in oocyst size." These alternatives are inconclusively discussed.

A. A.

Schumaker (E.). **Experimental Infection of Rats with the Balantidium from the Pig.**—Reprinted from *Science.* 1929. Oct. 18. Vol. 70. No. 1816. p. 384. [8 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The author succeeded in infecting rats with Balantidium by injecting, either into the caecum of the laparotomized rat, or into the rat by stomach tube, either concentrated culture of Balantidium or strained material direct from the colon of the pig. In a sum total of 48 operations on rats 19 were successful. The sundry infections in rats lasted from 2 to 23 days, and were localized in the caecum. Attempts to infect four rats with Balantidium-cysts from a monkey, and other four rats with Balantidium from the guineapig did not succeed.

A. A.

Faust (Ernest Carroll). **A Method for obtaining a Pure Culture of** *Balantidium coli.*—*Proc. Soc. Experim. Biol. & Med.* 1930. Apr. Vol. 27. No. 7. pp. 648–650. [3 refs.] [Dept. of Trop. Med., Tulane Univ. of Louisiana, New Orleans.]

By this method pure cultures are started on " various culture media " with balantidia that have been sterilized in weak solutions of agents—in particular acriviolet and neutral acriflavine—that kill the bacteria, but do not hurt the balantidia. In the process of sterilization the trophozoites are first freed from faecal and gross bacterial contamination, and at the

same time concentrated, "in a modified Ringer's fluid," and are then transferred first to a sterilizing 1/16,000 dilution of acriflavine (in which they remain active for 30 to 60 minutes), and finally under sterile precaution to the culture medium. Acriflavine was preferred since a thirty-minute exposure to a 1/16,000 dilution is convenient for manipulation and is less toxic for balantidia. It was found by experiment that healthy trophozoites could stand exposure in all dilutions from 1/70,000 to 1/20,000 for 60 minutes; in dilutions of 1/15,000 for 30 minutes; in dilutions of 1/10,000 for 10 minutes; and in dilutions of 1/5,000 for 5 minutes. "These experiments indicate that acriflavine is capable of sterilizing trophozoites of *Balantidium coli* against bacteria and yeasts in dilutions well within the viable limits of the ciliate."

A. A.

Kudo (R.). **Studies on Microsporidia Parasitic in Mosquitoes. VIII. On a Microsporidan, *Nosema aedis* nov. spec., Parasitic in a Larva of *Aëdes aegypti* of Porto Rico.**—*Arch. f. Protistenk.* 1930. Vol. 69. No. 1. pp. 23–38. With 67 figs. on 2 plates (1 double). [2 pages of refs.]

In this paper Microsporidian parasites of the Aëdes mosquitoes are chronologically reviewed and a new species *Nosema aedis* (*sic*) is described.

A. A.

Bonne (C.) & Soewandi. Een geval van Sarcosporidiosis bij den Mensch. [**A Case of Sarcosporidiosis in Man.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Nov. 1. Vol. 69. No. 11. pp. 1104–1106. With 4 figs. on 1 plate. [Med. High School, Batavia.]

The Sarcosporidia were found in a cavernous hemangioma from the lip of a Malay man. In a piece of muscle from the patient's calf nothing was found. As in similar cases reported, the authors consider their case to be without pathological significance.

W. J. Bais.

Wigglesworth (V. B.). **Some Notes on the Physiology of Insects related to Human Disease.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 553–570. With 6 text figs. [17 refs.]

The prologue of this interesting paper insists on the importance of the study of insect physiology, since, according to the author, an impression is prevalent that the specific resistance of a particular species of insect to a particular infection is governed entirely by single chemical processes occurring in the digestive tract. [This, of course, is not the view suggested by Metchnikoff, the early chapters of whose classical work on Immunity deal largely with the destruction of micro-organisms by animals that have not got a digestive tract and with intracellular destruction by invertebrates (including certain insects) apart from the digestive tract.]

The author begins with digestion in the cockroach, as a good example of an insect whose diet is as promiscuous as that of man. References to his original articles on the subject (*Biochemical Jl.*, 1927, Vol. 21, pp. 791–811, and 1928, Vol. 22, pp. 150–161) are given. This insect has a full tale of digestive ferments, except pepsin; in the crop it has amylase, and in the midgut invertase, lactase, trypsin, erepsin, and lipase all capable of work in a medium more acid than that of the human intestine.

As two insects having an alimentary tract of generally similar structure but an entirely different diet the tsetse-fly and the bluebottle are contrasted (see this *Bulletin, supra*, pp. 315, 316 for more detail on this matter). In respect of physiological differences, the saliva of the bluebottle, as of the cockroach, is rich in amylase ; in the tsetse-fly amylase is absent, but the saliva has been shown to contain an anti-coagulin that ensures the fluidity or mobility of the ingested blood in its passage along the intestine. In the tsetse-fly, too, the proteolytic ferments of the gut are more active. The nature and function of the so-called " bacteroids " or " symbionts " in the anterior part of the gut of the tsetse-fly are again discussed and the proventriculus and its peritrophic membrane again described.

The general nature of tracheal respiration is described.

" A new theory, complementary to that of Krogh, is advanced ; according to which the extent of air along the terminal tracheoles is controlled by the osmotic pressure of the tissue fluids ; and since the osmotic pressure increases in active tissues, the supply of air is greatest where it is most needed. Experiments on the mosquito larva are described, by which this theory is substantiated. Some observations on the entry of oil into the tracheal system of mosquito larvae are described."

A useful list of references is given. (In the appreciatory and far-ranging discussion of the paper, Dr. C. A. Hoare drew attention to the error of a statement, current in entomology, that in Hippobosca and Melophagus the crop is absent ; a crop is present in both, as well as in Lipoptena. And Col. F. P. Mackie stated that " some experiments in his own laboratory on a large scale had shown that there was no substantial difference between *X. cheopis* and *X. astia* as potential plague carriers.")

A. A.

Wigglesworth (V. B.). **A Theory of Tracheal Respiration in Insects.**—*Proc. Roy. Soc.* Ser. B. 1930. Apr. 2. Vol. 106. No. B 743. pp. 229–250. With 10 text figs. [15 refs.] [School of Hyg. & Trop. Med., London.]

The following is the author's summary :—

" A theory of tracheal respiration is put forward, which will provide for the increased demands for oxygen which arise locally in active tissues.

" If it be assumed that the terminal portions of the tracheal tubes are bounded by a semi-permeable membrane, then liquid will be drawn up the tubes from the tissues by capillarity until its progress is arrested by the osmotic pressure of the tissue fluids. During activity lactic acid, and, probably, other substances, will be produced, the osmotic pressure will rise, liquid will be absorbed and air will extend down the tubes towards the active tissues.

" This theory is supported chiefly by experiments on the larva of the mosquito. It has been found (i) that in the resting condition the terminal portions of the tracheoles are filled with liquid ; (ii) that during asphyxiation this liquid is absorbed, and the column of air extends rapidly towards the actively contracting muscles—more slowly and much later towards inactive tissues (for example, the anal gills) ; (iii) that on readmission of air the liquid slowly rises to its original level ; (iv) that during asphyxiation an excess of lactic acid is present in the tissue fluids ; (v) that hypertonic solutions of sodium chloride and potassium lactate introduced into the living larva cause extension of air down the tracheoles ; (vi) that the tissue fluids from an asphyxiated larva have a similar effect ; (vii) that

hypotonic fluids (distilled water) are without effect, or cause a slight rise of the liquid in the tracheoles.

"Some observations are recorded on the effects of certain poisonous gases and the effect of oil on the tracheal system."

A useful list of references is appended. A. A.

HECHT (Otto). Die Hautreaktionen auf Insektenstiche als allergische Erscheinungen. [**Skin Reactions to Insect Bites as Allergic Phenomena.**]—Reprinted from *Zool. Anzeiger*. 1930. Vol. 87. Nos. 3/6, 7/8 & 9/10. pp. 94–109; 145–157; 231–246. With 1 text fig. [34 refs.]

By its nature this long discussion (in which the work of other writers as well as the author's own experimental observations of bed-bug bite and the bite of *Anopheles maculipennis* are comprised) on the skin-reaction of insect-bite as a manifestation of allergy is largely, if reasonably, speculative. From all the facts reviewed the author holds that the sequelae of bed-bug bite and the primary irritant erythema following the bite of *A. maculipennis* are allergic phenomena, though the explanation of the secondary papule-like reaction to the bite of the latter insect is still uncertain.

It is well known that the bite of one and the same species of insect varies not only in the severity but also in the quality of its effects, according to the susceptibility or otherwise of the individual bitten. Clinically these susceptibilities or idiosyncrasies include shock, severe urticaria, affections of the bronchi, conjunctiva, and naso-pharynx, and gastro-intestinal disturbance. It is the explanation or classification of what is often carelessly called idiosyncrasy in the modern light of anaphylaxy, serology and allergy that is here attempted.

A. A.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE, TRANSACTIONS OF THE SEVENTH CONGRESS, BRITISH INDIA, 1927. Vol. 3. pp. 98–195. [**11 Papers on Medical Entomology.**]

Since the substance of several of the eleven papers here collected, which were read in 1927, has, in the interval, appeared elsewhere, there is little more now to do than to refer to those pages of this *Bulletin* in which notice of them has already been taken.

1. The paper by P. J. BARRAUD and G. COVELL on *The Morphology of the Buccal Cavity of the Mosquito*, is covered by the authors' reference to a paper by SINTON and COVELL which was noticed in this *Bulletin*, Vol. 25, p. 271.

2. A paper by V. A. STOOKES on *Some Anopheles of Sarawak*, discusses critically the 12 species *A. brevipalpis*, *A. barbirostris*, *A. umbrosus*, *A. sinensis*, *A. separatus*, *A. albotaeniatus*, *A. ludlowi*, *A. maculatus*, *A. leucosphyrus*, *A. punctulatus* var. *tessellatus*, *A. karwari*, and *A. kochi*. The author confirmed the infectivity of *A. ludlowi* in Nature.

3. In M. O. T. IYENGAR'S paper on *Regional Distribution of Anophelines and Malaria in Bengal*, the Province is dissected into six zones, as follows: (*a*) The Montane zone (E. Himalayas) of heavy rainfall and tropical forest, with the forest species *Anopheles gigas*, *A. lindesaii*, *A. aitkeni*, and *A. annandalii* as characteristic. (*b*) The Submontane zone

(foot-hills and terai) of heavy rainfall and (prior to extensive clearing for tea) dense forest ; intensely malarious, largely owing to invasion of *A. willmorii* into clearings. (*c*) Pastural zone, tending to be rocky and barren, rainfall moderate, drainage good ; very little malaria except where waters have been held in for cultivation. (*d*) Upper Delta zone, of low-lying alluvium (rice and jute country), of shifting and silted-up river-channels ; intensely malarious in parts where natural drainage is obstructed. (*e*) Lower Delta zone, mostly water-logged and barely above highwater-mark ; not malarious where the river channels are freely open to tidal influences. (*f*) Estuarine zone (Sunderbans), a maze of saltwater creeks, mangrove swamps and dense tidal forest ; *A. ludlowi* is a characteristic species, not found elsewhere in Bengal, and breeds freely in brackish water collecting behind embankments. In a neat diagram the author shows that each of these zones has its characteristic assemblage of Anopheles species.

4. In *Parasitic Nematodes of Anopheles in Bengal* M. O. T. Iyengar. describes and figures a species of Mermis and its behaviour as a temporary parasite observed in larvae of seven species of Anopheles.

5. *Microsporidian Parasites of Anopheles Larvae,* by M. O. T. Iyengar, describes three species of Thelohania and their life history.

6. *The Anopheles of the Australian Region, their Bionomics and their Distribution,* by F. H. Taylor, deals critically with 10 species (1 doubtful).

7. *Nomenclature of the Mosquitoes of Cochinchina and South Annam,* by E. Borel, is a bare list of names.

8. In *The Habits of Anopheles in Cochinchina,* E. Borel shows in tables the nature and conditions of the different breeding-grounds of the larvae, and the habits and pathogenous bearing of the adults.

9. The main part of J. A. Sinton's paper on *The Identification and Classification of the Species of the Genus Phlebotomus, with some Remarks on their Geographical Distribution in Relation to Disease,* is covered by his paper reviewed in this *Bulletin,* Vol. 26, p. 255.

10. *The Breeding of Sandflies in Nature and in the Laboratory,* by R. O. A. Smith, covers the matters of technique dealt with by two papers already noticed in this *Bulletin*—one by the author (Smith) in Vol. 22, p. 904 ; the other, by Young, Richmond, and Brendish, in Vol. 23, p. 869.

11. The *Study on the Seasonal Prevalence of House-Flies* in Chosen (Korea), by H. Kobayashi, has been in progress since 1916, and numerous instalments of it have been noticed in this *Bulletin,* from time to time. Here the author describes his methods of keeping flies under continuous observation—keeping them in broad test-tubes and fed on biscuit moistened daily with 5 per cent. peptone solution. In Chosen, flies generally are less frequent in the wet season (summer) than in the warm dry season. *Musca domestica* is in evidence the whole year round ; its numbers begin to increase in March, reach a maximum in May and June. decrease in midsummer, and increase again in early autumn ; after November it disappears, except in warm houses, where it is "not rare" and often propagates throughout winter. Other flies that winter as adults are the two species of Fannia and *Muscina stabulans,* and two species of Calliphora—these last also occasionally breeding then. *Stomoxys calcitrans* and a species of Sarcophaga winter as pupae, *Lucilia sericata* in prolonged larva and pupa stages.

A. A.

Nieschulz (Otto). Ueber die mechanische Uebertragung von einigen Bakterienkrankheiten durch blutsaugende Insekten. [**On Mechanical Transmission of Some Bacterial Diseases by Bloodsucking Insects.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 282–287 (366–371). [13 refs.]

This paper appears to be a review of somewhat belated experiments made in the Netherlands East Indies to test the capacity of various common bloodsucking flies to spread certain infections mechanically. The infections in question were surra, anthrax, buffalo-plague, and symptomatic anthrax, and the flies tested were species of Tabanus, Chrysops, Stomoxys, Lyperosia, *Musca inferior* (a true bloodsucker), Anopheles, Armigeres, and Stegomyia. The details (chiefly interesting to veterinarians) must be sought in the paper itself and its references; it is sufficient here to note the general conclusions that it is not easy to make a generally conclusive statement, since the capacity for mechanical transmission of the same disease differs with different flies; that undoubtedly bloodsucking flies can remain infective for several days—particularly Tabanidae, which in experiments with surra, anthrax, and buffalo-plague, were the best transmitters; and that the part played by such flies is not negligible.

A. A.

Travassos (Lauro). Ueber einige Arthropoden als Plagegeister der brasilianischen Küstenzonen. [**Some Arthropod Pests of the Brazil Coast.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 273–279 (357–363).

Discursive remarks on some simple pests (not transmitting disease) of the Brazil coast—the horse-tick (a species of Amblyomma), the *borrachudos* (unnamed Simuliidae), the jigger flea, the *Dermatobia hominis* larva (*berne*), the *motucas* (Tabanidae) and the *maruins* (Ceratopogons).

A. A.

Hoffmann (Carlos C.). Monografias para la entomologia medica de Mexico. [**Monographs on the Medical Entomology of Mexico.**]—*An. Inst. Biol. Univ. Nac. Mexico.* 1930. Vol. 1. No. 2. pp. 135–164. With 28 text figs.

In this, the first instalment, *Argas persicus*, *Ornithodorus megnini*, Dugés, *O. turicata*, Dugés, *O. talaje*, Guérin, and *O. coriaceus*, Koch, are fully described, along with a "key."

H. H. S.

Mayne (Bruce). **A Study of the Influence of Relative Humidity on the Life and Infectibility of the Mosquito.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1119–1137. With 3 figs. on 1 plate. [17 refs.]

This paper although long is a model of conciseness and must be consulted in original. In the introduction, recent writings on the inter-relations of humidity and temperature as affecting the life and the sensivity to infection of the mosquito are reviewed, and the detail of the author's laboratory menage is described. The range of

experiment includes the following series : Reaction of *Culex fatigans* to various temperatures below and above 80° F. Effect of humidities at various temperatures below 67° F. and above 80° F. on several species of Anopheles. Effect of humidity in *Anopheles subpictus* and *A. stephensi* infected with *Plasmodium vivax*. Species adaptation to relative humidity. Comparison of effect of drought and effect of high humidities on infection of *C. fatigans*. Influence of relative humidity on the biting stimulus of *C. fatigans*. Influence of heat on the life of the mosquito and its parasites. The details of the series of experiments are tabulated and discussed, and the author's final summary of results is as follows: —

" In experiments with *Culex fatigans* and organisms of bird malaria the minimum effective range of humidities permitting of both life of the mosquito and viability of the imbibed malaria organism was observed to be 44 to 46 percentage in both series of mosquitoes maintained at temperatures up to 72° F. and at temperatures above 80° F.

"At relative humidities under 42 percentage and dry bulb temperatures of 73° F. or under, out of a total of 195 mosquitoes applied only 4 specimens were induced to bite and these became infected. At temperatures above 80° F. at similar relative humidities none of 128 applied survived more than 4 days nor became infected. At equal temperature and 43 percentage humidity two specimens of mosquitoes survived 3 days, showing incipient parasite development.

" In similar tests with anophelines at temperatures under 67° F. and relative humidities from 38 to 55 percentage *A. culicifacies* and *A. subpictus* failed to survive one week, while more than 200 specimens of *A. fuliginosus* survived fully 17 days at a minimum relative humidity of 38 percentage. At temperatures above 80° F. these three species failed to resist a desiccating atmosphere of 40 to 42 percentage for more than 24 hours.

" At relative humidities ranging from 55 percentage and above at temperatures above 80° F. and at relative humidities above 57 percentage and at temperatures below 67° F. all three species survived from 1 to 4 weeks.

" The experiments on the effect of relative humidity on the development of the malaria parasites in *Anopheles subpictus* and *A. stephensi* resulted in survival and infection of 2 specimens of *A. subpictus* in 1 to 3 days at 39 to 42 percentage relative humidity and 4 specimens during a period of 6 to 13 days at relative humidity of 54 to 59 percentage. In the latter test, development in the mosquitoes was carried to the sporozoite stage.

" In the instance of six specimens of *A. stephensi* which succeeded in biting the patient, three of them during a course of 5 to 11 days at relative humidities of 80 to 88 per cent. demonstrated various stages of Plasmodian infection. Only one showed a few gland sporozoites.

" In these meteorological tests there was a definite result obtained indicating a species adaptation to relative humidity. This consisted of an effective range of relative humidity allowing for an infective period in the mosquito at an optimum temperature for functioning. The following range of percentage of minimum relative humidity was established. *A. fuliginosus* 38 to 40, *Culex fatigans* 43 to 45, *A. subpictus* and *A. stephensi* 55 to 58, and *A. culicifacies* 57 to 62.

" It was determined, for an aestivating period involving a relative humidity of 44 to 50 percentage, that infected mosquitoes (*C. fatigans*) survived for periods up to more than 3 weeks (24 days). These had been maintained at normal high humidities for 10 days previously. Seventy-eight per cent. of these retained their malaria parasites during the period of enforced drought, contrasted with 72 per cent. of control specimen, which remained infected through 34 days of the experiment.

" The relation of relative humidity to the stimulus of seeking blood in the mosquito was tested. The results of these biting tests indicate that

biting does not occur at relative humidities under 52 percentage even in the presence of high dry bulb temperatures. This demonstrates that this species of mosquito (*C. fatigans*) cannot be induced to bite in an atmosphere of relative humidity in which it is unable to survive desiccation."

A. A.

Beattie (M. V. F.). **Physico-chemical Factors in Relation to Mosquito Prevalence in Ponds.**—*Jl. Ecology.* 1930. Feb. Vol. 18. No. 1. pp. 67–80. With 5 figs. & 1 plate. [8 refs.] [Summarized in *Rev. Applied Entom.* 1930. June. Ser. B. Vol. 18. No. 6. pp. 109–110.]

Howland (L. J.). **Bionomical Investigation of English Mosquito Larvae, with Special Reference to their Algal Food.**—*Ibid.* pp. 81–125. With 10 figs. [26 refs.] [Summarized in *Rev. Applied Entom.* 1930. June. Ser. B. Vol. 18. No. 6. pp. 109–110.]

Both summaries relate to investigations of the same ponds, in Buckinghamshire. Chemical factors considered to bear upon the breeding of the mosquitoes (*Anopheles maculipennis*, *A. bifurcatus*, and various Culicines) were pH, H_2S, organic N, and dissolved O. There was no correlation between larval incidence and ammonia N. No biological significance is attributed to the small amounts of solids and chlorides. More attention should have been given to nitrates, nitrites, and phosphates. The second author examined 1,000 larvae of various species and noted the frequencies of the algae in the gut. No definite correlation was observed between the number of larvae and the pH and the CO_2 tension of the water, nor between the size of the larvae and that of the algae eaten. The larvae in any one pond did not seem to have any predilection for any one kind of food ; but the species occurring in a pond seemed to be related to the algal flora. Apparent correlations between the spring and summer phases of algae and the appearance of larvae were noted. The Culicines consumed more algae than the Anophelines.

A. A.

Matheson (Robert) & Hinman (E. H.). **A Seasonal Study of the Plancton of a Spring Fed Chara Pool versus that of a Temporary to Semi-Permanent Woodland Pool in Relation to Mosquito Breeding.**—*Amer. Jl. Hyg.* 1930. Jan. Vol. 11. No. 1. pp. 174–188. With 1 chart in text. [13 refs.]

The authors in N. America have studied the plancton of a drying mosquito breeding-pool during its summer existence of four months, and of a Chara pool for 12 months. Their observations show that both phyto- and zoo-plancton " are more varied and abundant in a non-breeding pool (Chara) than in a typical breeding-pool," and they therefore think that plancton cannot be the chief food of mosquito larvae. They suggest that the paradoxical inhibitory effect of Chara noticed by them may be due to excessive oxygenation of the larvae. They agree that " bacteria *per se* are not essential for mosquito breeding " ; and they think that varying pH in natural waters has little meaning.

A. A.

Hayes (T. H.). **Report of Mosquito Survey in St. Croix.**—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 194–222. With 1 map in text.

This is a record of a very well executed mosquito survey of St. Croix, a small unit, about 84 square miles in extent, of the Virgin Islands that lie east of Porto Rico. In 1926 immigrants from Porto Rico (where malaria is prevalent) began to settle in St. Croix. Before that event, malaria had for many years been extremely rare among the natives of St. Croix; afterwards (early in 1927) it began to be well noticed. It is now discovered that breeding-grounds of Anopheles—to wit, watercourses, streams, and natural ponds and freshwater lagoons—are more numerous than was supposed in an island having a reputation for dryness of soil; also that Anopheles, once said to be non-existent locally, is well represented by the dangerous *A. albimanus*, and that *A. grabhamii* has once been seen. Adults anophelines, however, have rarely been found inside houses, though common in stables, pigsties, corrals, and outhouses. In cisterns, rain-barrels, and domestic utensils of many kinds free breeding is provided for domiciled mosquitoes, among which *Culex* 5-*fasciatus* (=*fatigans*) and *Aedes aegypti* are included. All these matters are noticed in much detail, as well as the natural enemies that exist in the waters of the island.

A. A.

Shannon (Raymond C.). Creadouros de mosquitos em depositos artificiaes encontrados nos terrenos baldios. Zonas da Victoria e Nazareth, Bahia. [**Breeding of Mosquitoes in Uncultivated Land in the Nazareth and Victoria Districts of Bahia.**]—*Folha Med.* 1930. July 5. Vol. 11. No. 19. pp. 222–225.

This investigation was undertaken to ascertain the extent of breeding of Aedes in old tins, jars, coconut shell, etc., in waste land near dwellings. Of 284 such receptacles 236 contained larvae of some kind, 176 *Aedes aegypti* and many of them *Limatus durhami* also. The average numbers per receptacle containing water were :—

In Nazareth, 23·5 *Aedes aegypti*; 5·2 *Culex quinquefasciatus*; 4·8 *Limatus durhami*. In Victoria, 5·0 *Aedes aegypti*; 4·0 *Culex quinquefasciatus*; 13·0 *Limatus durhami*.

In Victoria houses occupied only one side of the waste land; in Nazareth such land more or less surrounded the houses. Generally speaking Aedes larvae were found in discarded tins (e.g., in 66 per cent. of those in Nazareth), and rarely further distant from dwellings than 200 metres; they were much fewer in broken pottery.

A. A.

Legendre (J.). La protection animale contre les moustiques au Sénégal et en Haute-Volta. [**Zooprophylaxis against Mosquitoes in Senegal and Haute-Volta.**]—*Bull. Acad. Méd.* 1930. Feb. 25. Year 94. 3rd Ser. Vol. 103. No. 8. pp. 221–224.

Legendre again descants on "zooprophylaxis," or the diversion of noxious and dangerous mosquitoes from man to his domestic and

domesticated animals, like the horse, bovines, pig, dog, rabbit, deer, monkey, crow, etc., with the object of awakening observers in the colonies to the importance of a serious study of the subject.

A. A.

Nieschulz (Otto). Bemerkung über Mückenzucht. [**A Note on rearing Mosquitoes.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Feb. 3. Vol. 115. No. 5/6. pp. 399–400. With 1 text fig. [Inst. for Infectious Diseases & Parasitology, Utrecht.]

This note describes and figures a feeding arrangement whereby the animal (e.g., a small guineapig) that supplies an infective feed lies outside the cage in which the insects taking the feed (e.g., *Stegomyia fasciata*) live, thus obviating the risk of escape of infected insects. The sleeved cage where the insects live is of gauze on a wooden frame. In its wooden roof is a largish hole, which is stopped-up by a shallow pocket (of fine-meshed gauze) that hangs into the cage. In this gauze pocket, or trough, the animal supplying the feed is closely confined, so as to expose its belly to the bites of the insects through the gauze. Within the cage, at some little distance below the pocket, a tin tray with absorbent wool has been slung horizontally, to catch the animal's urine and keep the insects' residence clean.

A. A.

Strickland (C.) & Chowdhury (K. L.). **On trapping Adult Mosquitoes.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1009–1014. With 2 text figs. [1 ref.]

In the course of malaria surveys in Upper Assam during the hot and the rainy seasons of two years (1927 and 1928) traps of two kinds were compared for catching adult mosquitoes in cowsheds and other buildings. One kind is an ordinary tea-plucker's basket fitted with a lid having an entrance-hole and served inside and outside with cowdung: the other kind is an ordinary tea-box with entrance-hole (and movable cover) and blackened inside. In the comparisons in all localities a trap of each kind was set, side by side. The figures of the catches are tabulated. The general conclusions are that the box-trap was about 12 per cent. better than the basket-trap for catching both culicines and anophelines; that females were caught very much more frequently than males in the box-traps; and that "apparently the boxes were much better than the baskets as far as nearly all the anopheline species, including the well-known malaria-carriers, were concerned."

A. A.

Miyamoto (Saichi). Ueber die Vernichtung von Moskitos durch *Pipistrellus abramus* in der Nähe der Stadt Taihoku. [**On the Destruction of Mosquitoes by *Pipistrellus armatus* in Taihoku.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1930. Apr. No. 301. [In Japanese. German summary p. 19.] [Med. School, Taihoku.]

In the stomach of 12 of 45 bats (*P. abramus*) examined between August and December the author found mosquitoes. As an instance of the appetite of this kind of bat one individual was able to catch 1,537 mosquitoes in 3 hours, and three others had the stomach more than half full of those insects.

A. A.

Kaiser (L.). Het intermitteerend moeras van Rangas. [**The Intermittent Swamps of Rangas (Celebes).**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. July 1. Vol. 70. No. 7. pp. 692–694. With 2 figs. on 1 plate.

The point here is that the mosquito-larvae of a tidal swamp near a malarious sea-coast village in Celebes did not die when the water ran out with the ebbing tide. The swamp therefore had to be filled in above the level of high-water mark.

W. J. Bais.

Ancona (H. L.). Las lemnaceas y las larvas de los mosquitos. [**Lemnaceae and Mosquito Larvae.**]—*An. Inst. Biol. Univ. Nac. Mexico.* 1930. Vol. 1. No. 1. pp. 33–37. With 5 text figs. [2 refs.]

Lemna even in a continuous layer did not retard development of *Culex tarsalis* or *Anopheles quadrimaculatus*; azolla did so under natural conditions only when in a thick layer, but experimentally a very thin layer of the two together was effectually preventive.

H. H. S.

Maslow (A. W.). Das kritische Temperaturminimum der ueberwinternden Mücken. [**The Critical Minimum Temperature for Hibernating Mosquitoes.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Mar. Vol. 34. No. 3. pp. 170–173. [2 refs.] [Malaria Station, Tomsk.]

The critical temperature for the wintering *Anopheles maculipennis* is here determined to be −40° C., and for the wintering *Culex pipiens* −17 to −18° C. At an average mean temperature of −18° C. and an average minimum temperature of −23° C. *A. maculipennis* can live for weeks or months.

A. A.

Dover (Cedric). **An Improved Citronella Mosquito Deterrent.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. p. 961.

It is well known that oil of citronella, used as a mosquito deterrent, often irritates the skin and quickly loses effect from its volatility. The following formula has been found effective.

" Citronella oil (Burgoyne's)	½ oz.
Spirits of camphor	¼ oz.
Cedar-wood oil	¼ oz.
White petroleum jelly (B.P.)	2 ozs.

" The petroleum jelly should be melted and the other constituents then added, the mixture being well-stirred. Bottle (a 3 oz. wide-mouthed jar is a convenient size) and cool rapidly, preferably by placing the bottle (which should be kept closed) in a basin of cold water or in a refrigerator.

" The formula gives a firm, whitish, non-staining cream of pleasant odour which, in addition to its properties as a mosquito-deterrent, is soothing, antiseptic and beneficial to the skin (petroleum jelly, it will be remembered, is the base of most face creams). One application usually lasts for a whole night, and only a very small quantity need be used on each occasion. To avoid using it on the face in the evenings, the cream has been employed by some as a brilliantine for the hair, as it was found that for a time this keeps mosquitoes away almost as successfully as if the whole face were smeared with it."

J. F. C. H.

de Boissezon (P.). Les réserves dans le corps gras de *Culex pipiens* L. et leur rôle dans la maturation des oeufs. [**The Reserves in the Fat-Body of *Culex pipiens* L. and their Rôle in the Maturation of the Eggs.**] —*C. R. Soc. Biol.* 1930. May 1. Vol. 103. No. 14. pp. 1232–1233. [1 ref.]

——. Le rôle du corps gras comme rein d'accumulation chez *Culex pipiens* L. et chez *Theobaldia annulata* M. [**The Rôle of the Fat-Body as a Stock of Capital in *Culex pipiens* L. and in *Theobaldia annulata* M.**]—*Ibid.* pp. 1233–1235. [1 ref.]

In an earlier paper (*supra*, p. 296) the author reported that it is possible for the female of *Culex pipiens* though kept rigorously starved to produce egg-rafts, provided she had been well fed on a diet rich in proteid during her *larval* phase. In the present studies he traces the secretion of fatty globules and albuminoid granules in cells of a special kind (trophocyte) in the fat-body in the peripheral cells of which body they accumulate as a store of nutriment. He follows the process from its beginnings in the early larva stage to its issue in the imago stage, and in the starved female he notes the disappearance from the cells of the fat-body of all the albuminoid granules and most of the fat globules after the maturation and discharge of the eggs.

A. A.

Shannon (R. C.), Burke (A. W.) & Davis (N. C.). **Observations on Released *Stegomyia aegypti* (L.) with Special Reference to Dispersion.**—*Amer. Jl. Trop. Med.* 1930. Mar. Vol. 10. No. 2. pp. 145–150.

—— & Davis (N. C.). **The Flight of *Stegomyia aegypti*.**—*Ibid.* pp. 151–156. With 1 map in text. [4 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

i. In the course of four experiments, 3,500 of *Stegomyia aegypti* were stained and set free in a house affording food, water, and good shelter, and also harbouring some lizards (gecko) and spiders. At the end of a week, more than 90 per cent. had disappeared from that house, and two weeks afterwards less than 1 per cent. could be found there. One specimen was retrieved, 17 days after release, in a house 120 metres distant. In one of the experiments, when the search for the stained insects began on the next day, 54 per cent. were recovered that day and another 15 per cent. in the course of the five days following, and of the whole of these (69 per cent.) 66 per cent. were taken in the house of release, and 3 per cent. in a house adjoining. It is noted that gentian-violet is a bad stain for the insects. Weak water-solutions of methylene-blue and of eosin were used.

ii. In the course of 3 experiments, 20,000 stained individuals of *Stegomyia aegypti* were set free in small villages in the outskirts of Bahia (Brazil). Two individuals were recovered in houses more than 300 metres distant from the point of release, and 95 at points intermediate.

Another lot of 12,000 stained individuals were liberated from a boat 900 metres distant from one bank of a river and 300 metres from the other. Less than 0·4 per cent. of them were recovered. Eight individuals were retaken on the more distant bank. After a week stained individuals became exceedingly scarce. The last recapture was made 13 days after release.

The above experiments, as the authors state, suggest either that dispersion is very quick and wide, or that mortality is very high.

A. A.

Symes (C. B.). **Anophelines in Kenya.**—*Kenya & East African Med. Jl.* 1930. Apr. Vol. 7. No. 1. pp. 2–11. With 5 figs. (1 map). [1 ref.]

It is stated in this excellent report that 19 species of Anopheles have been encountered in Kenya. In over 15,000 searches within dwellings and cattle-bomas and stables, during 18 months, 10 species have been caught, but 6 of them so rarely that " their presence in buildings seems to be purely accidental," ; the prevalent domiciliary species are four, namely, *costalis* and *funestus*, and after them *christyi* and *cinereus*. (It is noted incidentally, that the smoke-laden atmosphere of native huts is no hindrance to the entry of anophelines.) *A. cinereus*, though not entirely exclusive in taste, definitely prefers blood of cattle ; so also perhaps does *christyi*.

A. costalis and *funestus* " in all areas dealt with are pre-eminently the domestic species." In 1,011 precipitin tests with *costalis* 82·3 per cent. were positive to human blood. *A. costalis* breeds mostly in open stagnant water, and occurs in greatest numbers soon after the onset and throughout the course of the wet-season ; *A. funestus* prefers clear and shaded water, and is most abundant when rivers return to normal flow after the wet season, though in places where larvae are naturally protected from the flushing effect of rain-storms it may be numerous also during the wet season. Both species are naturally infected and infective in Kenya. (Other Kenya species examined—in very small numbers—for infectivity have given a negative result, so far). Present evidence justifies the conclusion that *A. costalis* is responsible for the wet-season rise (and for at least one epidemic) of malaria when the predominant infection is subtertian. The evil part played by *A. funestus* is less exactly known ; this species is much more numerous than other species in areas of high malarial endemia, some of which are foci of blackwater and sometimes also of *P. malariae*. The flight of these anophelines has not been studied experimentally, but there is fairly trustworthy evidence of a flight of more than 3 miles from the nearest known breeding-grounds by *A. costalis*.

Some " small investigations," as the author describes them, have been made of the pivotal circumstances influencing larval development. No evidence has been elicited that any given species is influenced by changes of pH inside limits that normally occur in its natural waters. On the other hand, results so far obtained with oxygen absorption of anopheline breeding-waters (as a rough measure of organic matter) appear to promise something.

A. A.

Chodoukine (N. J.). Mécanisme hétérodynamique chez quelques espèces d'Anopheles. [**Heterodynamy in Anopheles.**]—*Pensée Méd. d' Usbéquistane et de Turquménistane.* Tashkent. 1930. Apr.–May. No. 7/8. pp. 58–66. [In Russian script. French summary pp. 123–124.]

The author observes that females of *Anopheles hyrcanus*, issuing from autumn larvae, when they are fed on blood, do not form a fat-body and die in 5 or 6 days ; but when they are fed on syrup they proceed to form a fat-body and to hibernate. Hibernating females of the local variety of *A. maculipennis* will suck blood in the laboratory, and will then lay eggs, but their fat-body shrinks. He observes also that

autumn-issuing females of *A. bifurcatus* and *A. pulcherrimus* have not a fat-body when they issue from the pupa-case, but that the hibernating larvae of these two species have the fat-body very well developed; whereas the contemporary females of *A. superpictus, hyrcanus*, and the local *maculipennis* have a fat-body when they issue, though in the hibernating larvae of these three species the fat-body is ill developed. In a year-long study of the female salivary glands of Anopheles the author finds that their anticoagulant activity begins to fail in winter, concurrently with the development of the fat-body.

A. A.

Iyengar (M. O. T.). **Dissolved Oxygen in Relation to Anopheles Breeding.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1171–1188. With 17 charts & 1 text fig. [1 ref.]

In 332 ponds and ditches at Sonapur in Lower Bengal, in which six species of Anopheles were breeding, the author studied the range of variation in the amount of dissolved oxygen. Estimation of dissolved O was carried out by Winkler's method, care being taken to make sure that dissolved nitrites were not present. The dissolved oxygen ranged from zero to 6·5 mgm., but in the majority of breeding-places from 1 to 4 mgm., per litre of water. A diurnal fluctuation in dissolved oxygen concentration was constantly observed in the surface-water of ponds, the level being lowest at 6 a.m. and highest between 2.30 and 3.30 p.m. All the species of Anopheles present (*barbirostris, hyrcanus, fuliginosus, varuna, subpictus, pseudojamesii*) were found breeding in all degrees of dissolved oxygen concentration; nor were the larvae affected in any way by the diurnal fluctuation. The numbers of *pseudojamesii* and *hyrcanus* larvae, it is true, showed a diminution with increasing oxygen concentration; but it is possible that this apparent relation is merely coincidence "due to the association of these two species with the aquatic plant Pistia." The author, at any rate, maintains that "there is no evidence of any 'oxygen toleration limits' in any of the species studied."

A. A.

Pashitnowa (Z. A.). Materialien zur Erforschung der Mikrofauna der Reisfelder und die Biologie der Anopheleslarve auf den Reisfeldern. [**Material for the Study of the Microfauna and the Biology of Anopheles Larvae in Ricefields.**]—*Acta Univ. Asiae Mediae.* Tashkent. Ser. 8a. Zool. 1929. No. 10. pp. 1–36. [25 refs.] [In Russian script. German summary pp. 37–40. With 4 figs.]

This is a general survey of ricefields around Tashkent in Turkestan, and their microphyta and microfauna (Protozoa, rotifers, Entomostraea, insect larvae, etc.). Three species of Anopheles larvae were observed—*A. pseudopictus, A. maculipennis*, and *A. pulcherrimus*—particularly in the early part of September. Examination of the gut of 55 larvae of sundry ages showed them to be for the most part omnivorous (chiefly diatoms and other microphytes). Under conditions as near as possible to nature, at temperatures ranging from 20° C. to 28° C., their aquatic development was completed in 22 to 13½ days.

A. A.

Sepulcri (Piero) with the collaboration of Scrinzi (Enrico). Contributo allo studio del problema dell' anofelismo nel Veneto. (Valli da pesca e caccia, bonifiche e anofelismo.) (**Contribution to the Study of Anophelism in Venetia. Fenland and Fenced Fisheries, Agrarian Sanitation Works and Anophelism.**)—*Riv. di Malariologia.* 1929. Nov.–Dec. Vol. 8. No. 6. pp. 637–668. With 14 text figs. (3 maps). [English summary p. 747.]

The point of general interest in this local Venetian problem is that the drainage of one tract where anopheles larvae flourish, although it may benefit that tract from the agricultural standpoint, may increase the " anophelism " of another neighbouring tract where the drainage channels debouch. Thus, in the " valli " (fenced freshwater fisheries) of a lagoon and its surrounding fenland, anophelism, which naturally is rare in the valli, is favoured there by the inflow of water from the assanitation works of the fenland. [The argument is better expressed in the French summary (p. 745) than in the English.]

A. A.

Mieldazis (J. J.). **Preferential Breeding Conditions of Anopheles in the Philippine Islands.**—*Philippine Jl. Sci.* 1930. Jan. Vol. 41. No. 1. pp. 59–63. With 6 plates.

In the Philippine Islands *Anopheles minimus* favours streams heavily shaded by bamboo ; *A. maculatus*, streams exposed to the sun ; *A. philippinensis*, Pistia waters ; *A. ludlowi* and *A. subpictus*, brackish and salt water ; the particularly common *A. vagus*, contaminated waters ; *A. barbirostris*, water-weed at edges of streams or floating in rivers, and ricefields ; *A. fuliginosus*, streams and rivers and ponds of rainwater ; *A. kochi*, pools of rainwater and rice-fields.

A. A.

Brighenti (Dino). La distribuzione geografica degli anofelini in Italia. (**Geographical Distribution of Anophelines in Italy.**)—*Riv. di Malariologia.* 1929. Nov.–Dec. Vol. 8. No. 6. pp. 694–701. [27 refs.] [English summary p. 748.] [Zoolog. Inst., Univ., Bologna.]

Anopheles maculipennis, *A. bifurcatus*, and *A. algeriensis* are distributed throughout the Italian peninsula. *A. plumbeus* only in the northern area, *A. superpictus* and *A. italicus* in the south, *A. sacharovi* and *A. pseudopictus* in coast-land and rice-lands.

A. A.

Iyengar (M. O. T.). **Larvae of Oriental Tree-Hole Breeding Anophelines.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 769–776. With 2 plates. [12 refs.]

The chronological history, geographical distribution, generally distinctive characters, and individual differential characters of the larvae of the Oriental tree-hole anophelines are here discussed. They are all, so far as is known, restricted to hill forests. The species are *Anopheles culiciformis*, from the hills of the Malabar coast ; *A. barianensis*, from the Punjab and Kashmir above 6,000 ft. ; *A. annandalii* from the E. Himalayas, Khasi Hills, and Ceylon ; *A. annandalii* var. *djajasensis* from Java above 4,000 ft. ; and *A. asiaticus* from the Malay Peninsula. (A mention is made of *A. sintoni*—described as a new species by Puri in *Ind. Journ. Med. Res.*, 1929, Oct.—which is found in the same tree-holes with *A. culiciformis*.)

A. A.

Walch (E. W.) & Soesilo (R.). **A Comparative Study of the Pecten of the Netherlands Indies Anopheles-Larvae, preceded by Some Other Morphological Observations.**—*Meded. Dienst. d. Volksgezondheid in Nederl.-Indië.* 1929. Vol. 18. No. 3. pp. 453–468. With 24 figs. on 2 plates (1 folding). [13 refs.] [Med. Lab., Weltevreden.]

This is a minutely comparative entomological study, freely illustrated. Attention is drawn to the fact that the pectens of Anopheles larvae besides their well-defined and sometimes diagnostic specific differences, may also show conspicuous subter-specific variations from the specific standard. It is noted (in their local provenance) of their closely similar larvae that the pectens of the saltwater forms of *ludlowi* and *rossi* are different, though the pectens of the freshwater forms cannot be distinguished from one another ; the clypeus hairs, however, of almost all freshwater *rossi* larvae are branched and of almost saltwater *rossi* are not branched.

A. A.

Bragina. Anopheleslarven fressende Hydra. [**A Hydra devouring an Anopheles Larva.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 57–58 (141–142). With 1 text fig.

Enlarged drawing of a Hydra with a partly digested Anopheles larva in its stomach, ejecting the larval skin, and at the same time holding and proceeding to swallow another Anopheles larva. The Hydra was swimming free in an aquarium.

A. A.

de Buen (E.). Etude expérimentale sur quelques méthodes employées dans la lutte contre les larves d'Anophèles. [**Experimental Study of Some Methods of suppressing Anopheles Larvae.**]—*Bull. Soc. Path. Exot.* 1930. Apr. 9. Vol. 23. No. 4. pp. 402–427. With 1 text fig.

The conclusion of these studies is that the best and cheapest method of clearing out Anopheles larvae is a confederation of the Cyprinodont fish Gambusia and Schweinfurt green (aceto-arsenite of copper). To start with, the fish are let loose, and then, in prudent time (and if it be found necessary), applications of the arsenite are made every ten days so long as they appear to be needed. Thereafter, if the original Gambusias have disappeared, another batch must be brought in as a garrison.

A. A.

Quaife (W. T.). **A Trial of Paris Green as a Larvicide in Moving Water in Selangor, F.M.S. With a Summary of Previous Work on Paris Green.**—*Malayan Med. Jl.* 1930. Mar. Vol. 5. No. 1. pp. 26–29. [24 refs.]

The sample used contained 54·5 per cent. arsenic as arsenious acid. The trial ground was 300 metres of open earth drains with slowly moving clear water. The anophelines were chiefly *A. maculatus* and *A. vagus*. The sample was diluted with finely sifted wood ashes and scattered by hand : but " hand-scattering is not a sound method for practical work." The application was made weekly from September to January. All larvae were not killed unless 2 cc. in 5 cc. of dust were used per square metre, an uneconomic proportion. In the quantity recommended there was little diminution of large larvae. It is concluded that Paris green appears to be of little or no value as a larvicide for inland Malaya, where

the majority of breeding places of dangerous anophelines consists of water moving more or less rapidly.

The author gives a summary of the papers published on this subject, from which he concludes that for moving water it has yet to be shown that Paris green can supplant oiling.

A. G. B.

DE BUCK (A.), SCHOUTE (E.) & SWELLENGREBEL (N. H.). **Racial Differentiation of "Anopheles maculipennis" in Netherlands and its Relation to Malaria.**—*Riv. di Malariologia.* 1930. Mar.–Apr. Vol. 9. No. 2. pp. 97–110. With 2 figs. [15 refs.] [Royal Colonial Inst., Amsterdam.]

In 1926 and 1927 (see this *Bulletin*, Vol. 23, p. 712, and Vol. 24, p. 883) VAN THIEL drew attention to the existence in certain parts of Holland of two distinct varieties of *Anopheles maculipennis*. One, which predominates in non-malarious districts, is larger, lighter, longer in wing, and (female) has fewer maxillary denticles; the other, which breeds in the brackish waters of malarious tracts, is smaller, darker, shorter in wing, and (female) is more denticulate. He suggested that the slight structural modifications of the latter variety, as well as its particularly facile concurrence with endemic malaria, might have been brought about through the changed conditions of its larval life in brackish water. Subsequently the authors of the present paper (see this *Bulletin*, Vol. 24, pp. 879–880, and Vol. 26, p. 915) also noticed the occurrence in Holland of these two varieties, one breeding in fresh water and the other in brackish water, and seemed to be not ill-disposed towards VAN THIEL'S suggestion. They further observed that although both varieties are hospitable to malaria, the shorter-winged pluridenticulate variety is more continuously voracious than the other variety, and also remains considerably active during winter, and thus (so they argued) is better qualified to acquire the infection and to maintain it through winter than is the longer-winged variety which remains quite dormant throughout that season.

In the present paper the collaborators dissent from the view that the differences of the shorter-winged variety are directly traceable to peculiar conditions of its larval life in a saline medium. They indicate the existence of other [frail] differences besides those mentioned—to wit a difference in the number of "ribs" in the floats of the egg, a difference in the number of branches in a particular hair of the larva, and a difference in the form of a particular spine of the claspette of the male. They state that all the differences between the two varieties breed true for each variety in insects bred "under exactly the same conditions" from eggs obtained in nature (and also for the insects of the short-winged variety raised from individuals that had themselves been bred in the laboratory), and they are therefore convinced that the two varieties are "two races" and "differ genetically and not only through the influence of dissimilar external conditions." [We here meet the at present insoluble problem of the exact method of evolutionary progress—whether it is brought about by modifications of the environment, or entirely by changes in the inherent constitution of the organism, or by the interplay between the environment and the hereditary constitution of the organism—a controversy that lies outside the range of this *Bulletin*.] Beside the small structural differences, the authors confirm and amplify those "biological"

differences between the two varieties or races that make the one an efficient and the other an inefficient agent in the maintenance of malarial infection, namely—(1) the earlier advances of hibernation and the complete abeyance of feeding and sexual ability of the long-winged race throughout winter ; and (2) the later advances of hibernation and the persistence of blood-appetite and sexual capacity in the short-winged race during that season. It is noted that owing to the inability of the long-winged males to pair in close confinement the authors could not prove that this race breeds true from parents " raised " in captivity ; also that owing to the repugnance of the wintering long-winged females to blood they are bad laboratory subjects for experimental malaria infection. All their observations confirm the authors' view that the long-winged race is but a summer visitor in houses, whereas " the short-winged race is essentially an indoor mosquito."

A. A.

Trensz (F.). Recherches sur l'index maxillaire de *Anopheles maculipennis*, (note préliminaire). [**Investigations of the Maxillary Index of** *Anopheles maculipennis*. **Preliminary Note.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 43–47. [2 refs.] [Pasteur Inst. of Algeria, Algiers.]

Roubaud (E.). Quelques remarques à propos de l'interprétation théorique des index maxillaires. [**Some Remarks on the Interpretation of the Maxillary Index.**]—*Ibid.* pp. 47–53.

From a study of 4,244 maxillary indices of *Anopheles maculipennis* in Algeria, Italy, and continental France, Trensz, in this preliminary paper, cannot discover a single fact in favour of E. Roubaud's theory of zoo-tropism. Roubaud in his reply to this criticism remarks on the necessity of taking thought against hasty and peremptory arguments.

A. A.

Boyd (Mark F.). **The Cage Rearing of** *Anopheles quadrimaculatus*.—*Amer. Jl. Trop. Med.* 1930. May. Vol. 10. No. 3. pp. 165–175. With 5 text figs. [Station for Field Studies in Malaria, Edenton, North Carolina.]

Descriptions in minute detail of an insect-house 8 feet square and 12 feet high, designed for the " development of a technique that will permit the successful cage-rearing of anophelines for indefinite generations." The descriptions cannot be abridged. It appears, however, that after several years of trial and partial success the author has managed to breed only to a third generation—less in number and less bloodthirsty than the second generation, and failing to produce eggs.

A. A.

Sawadsky (M.). *Anopheles pulcherrimus* (Theob.) als Malariaüberträger (vorläufige Mitteilung). [*Anopheles pulcherrimus* **Theob. as a Malaria-Carrier (Preliminary Communication).**]—*Pensée Méd. d' Usbequistane et de Turqumenistane*. Tashkent. 1929. Nov.–Dec. No. 2/3. pp. 22–24. [4 refs.] [In Russian script. German summary pp. 146–147.]

It is stated in the German summary that *Anopheles pulcherrimus* is widely distributed in Central Asia, although malaria-infected individuals had never been discovered in nature. The announcement is made that a female with sporozoites in the salivary glands has come to light in the Golodnaja Steppe.

A. A.

Hecht (Otto). Ueber die Eiablage von *Anopheles bifurcatus*. [**The Ovipositing of** *Anopheles bifurcatus*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Dec. Vol. 33. No. 12. pp. 640–644. [12 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Observations, with some long digressions, on the ovipositing of *Anopheles bifurcatus* in captivity. As a novel observation the author states that the eggs for the most part were laid on the inhospitable ground of the cage, although three water-vessels were provided.

A. A.

Smorodinzew (I. A.) & Adowa (A. N.). Le rôle du calcium dans l'écologie des larves d'anophèles. [**The Rôle of Calcium in the Ecology of Anopheles Larvae.**]—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 34–38. With 1 text fig. [3 refs.]

—— & ——. Sur le rôle de la réaction du milieu dans l'écologie des larves d'*Anopheles maculipennis*. [**On the Rôle of the Reaction of the Medium in the Ecology of** *Anopheles maculipennis* **Larvae.**]—*Ibid.* pp. 39–43. With 1 text fig. [4 refs.] [Trop. Inst., Moscow.]

These two papers merely emphasize the facts already explained above (p. 298).

A. A.

Shannon (Raymond C.). O apparecimento de uma especie africana de anopheles no Brasil. [**An African Anopheles found in Brazil.**]—*Brasil-Medico.* 1930. May 10. Vol. 44. No. 19. pp. 515–516. [Yellow Fever Lab., International Health Division, Rockefeller Foundation, Bahia, Brazil.]

The author, who works in the Yellow Fever Laboratory in Bahia, was making a mosquito survey in Natal, Rio Grande do Norte [N. of Pernambuco] in March this year. In one inundated district near Rio Potengy where there were no fish, he found hundreds of nymphs and larvae of a mosquito not known in South America, and which proved to be *A. costalis*. This identification was confirmed by N. C. Davis.*

H. H. S.

Marzinowsky (E. I.) & Schourenkova (A.). Sur le *Phlébotomus caucasicus* Marz. [**On** *Phlebotomus caucasicus* **Marz.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 10. pp. 671–674. [4 refs.] [In French. Russian summary. With 4 text figs. 3 refs.]

The French summary explains at some length (1) that the *Phlebotomus li* described and figured, in 1926, as a new species, by Popoff, is identical with (and therefore becomes a mere unfortunate synonym of) the *Phlebotomus caucasicus* described by Marzinowsky in 1917; and (2) that the "Phlebotomus caucasicus" redescribed and figured by Popoff (1926) is identical with the *Phlebotomus sergenti* of Parrot (1917). [According to Newstead the *Phlebotomus caucasicus* of Marzinowsky also is identical with the *P. sergenti* of Parrot.]

A. A.

* Confirmation of this discovery will be awaited with interest.—Ed.

Schourenkova (A.), Demina (N.) & Pavlova (P.). **A Simple and Rapid Method of the Identification of the Females of Phlebotomus.**—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 10. pp. 675–686. With 28 figs. on 4 plates. [In Russian. English summary pp. 687–688.]

The features of the spermathecae are brought out by treatment with lactic acid. Specimens of Phlebotomus that have been preserved in alcohol are transferred from alcohol to pure lactic acid for 4 to 24 hours; the terminal segments of the abdomen are then cut off and transferred in the lactic acid to a slide for permanent mounting under a cover-glass; very cautious heating of the slide hastens visibility. Dried specimens can be treated in exactly the same way after they have been soaked in 95 per cent. alcohol, as also can specimens that are mounted in balsam, after they have been dismounted by xylol and washed with spirit.

A. A.

Graham-Smith (G. S.). **Further Observations on the Anatomy and Function of the Proboscis of the Blow-Fly, *Calliphora erythrocephala* L.**—*Parasitology.* 1930. Jan. Vol. 22. No. 1. pp. 47–115. With 4 plates & 36 text figs.

This is a detailed description, well illustrated, of the anatomy of the proboscis of the common blow-fly and of the functions of the structures found in it, attention being emphasized on the fact that the fly can feed in several ways: it can filter larger particles out of liquid food, or can scrape chosen surfaces moistened with vomit or saliva with its prestomal teeth, and afterwards ingest the emulsion so produced, or can suck up thick sputum (or faeces) containing helminth eggs without intervention of its filtering apparatus or teeth. The relation of these modes of feeding to infection is very briefly indicated by descriptions and figures.

A. A.

Brandau (George M.). **Rhinal Myiasis.**—*Amer. Jl. Med. Sci.* 1930. May. Vol. 179. No. 5. pp. 643–653. [30 refs.]

The author prefaces summaries of two typical cases of that infestation with a good epitomized account of rhinal myiasis—its aetiology, symptoms, complications, and treatment—concluding with a very useful bibliography. The very serious and destructive complications that may occur if the ravages of the maggots are not checked in good time are mentioned; Yount and Sudler (*Journ. Amer. Med. Assoc.*, 1907, 1912) "in a series of 23 cases of myiasis [give] a mortality of 22 per cent in 18 nasal cases." Various methods of treatment are reviewed. Persons suffering from ozoena due to any chronic nasal disease should be warned of the dangers of rhinal myiasis and of sleeping in the open. Apart from treatment of symptoms and of destructive lesions the immediate treatment is to remove the maggots, partly by mechanical means (forceps, antiseptic irrigations, etc.) partly by larvicidal vapours or injections, continued from time to time until all the maggots have been cleared out. Pledgets soaked in chloroform may be placed in the nostrils and left for 5 minutes, or the nasal passages may be washed out with a 20 to 25 per cent. dilution of chloroform or ether in milk or olive oil.

Of the 2 cases reported, No. 1 was in a negro youth who ejected a dead fly from his nose some days after he had slept out in the open. Perforation of soft palate and nasal septum occurred before all the [uncounted]

maggots (*Cochliomyia macellaria*) were removed—by nasal irrigations first of ether 50 per cent. solution in olive oil, subsequently of chloroform in milk. Case No. 2 was of a boy who began to suffer from nasal irritation a few days after a fly had flown into his nose when he was riding. Maggots [unidentified] to the number of 170 were discharged or removed, by irrigation with 20 per cent. dilution of chloroform in milk. Some intranarial erosion and a copious bleeding from the nose occurred. Treatment in both cases was successful.

A. A.

Chesneau (Pierre) & Tran-van-Manh. Rhinomyiase à *Chrysomyia bezzianum* [*sic*]. [**Rhinomyiasis by** *Chrysomyia bezziana.*]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1929. Aug.-Sept. Vol. 7. Nos. 8–9. pp. 410–413.

This case exhibited the well known symptoms and signs of myiasis of the nasal passages—intractable frontal headache and paroxysms of sneezing soon succeeded by inflammatory oedema extending to the brows and cheeks, and a sanious foetid discharge from the nostrils. Examination disclosed the presence of maggots, perforation of the nasal septum and other evidence of local destruction, and perforation of the palate and escape of maggots into the mouth. By means of chloroform inhalations, free flooding of the nasal passages, and the use of forceps, 65 maggots were removed (in addition to those that escaped), and by the 9th day all the larvae had been expelled and the symptoms were abated. Maggots kept for observation pupated on the 10th day and hatched 13 days afterwards. The flies were determined by Roubaud as *Chrysomyia bezziana.*

A. A.

Pilkington Brothers Ltd. **Coloured Glass as a Deterrent to House Flies.** [Correspondence.]—*Nature.* 1930. Apr. 5. Vol. 125. No. 3153. p. 529.

Pilkington Brothers Ltd., of the Crown Glass Works, St. Helens, Lancashire, in recent experiments in this subject found that—everything else being equal—red and yellow glass are good deterrents of houseflies, yellow in particular being " very effective " in connexion with the storage of food.

A. A.

Newsad (A.). Sarcoptesmilben auf den Stubenfliegen. [**Sarcoptes on Houseflies.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. July. Vol. 34. No. 7. pp. 399–400.

In the course of examining houseflies for a set purpose the author observed on the abdomen of one of them (that had been kept in a clean vessel for 3½ weeks) a living adult " Sarcoptes-mite." Thereupon he searched about a hundred more houseflies, all bred in the laboratory, and found on one of them a " Sarcopteslarva." The laboratory lies about 50 metres from a Veterinary clinic, and about 100 metres from a medical clinic and a cavalry depot.

A. A.

Tanganyika Territory. **Tsetse Research Annual Report for the Year ended 31st March, 1929** [Swynnerton (C. F. M.), Director of Tsetse Research.]—18 pp. Dar Es Salaam. [2s. 6d.] [n.d.]

Early in 1925 a large-scale investigation of the question of controlling cattle tsetse-fly in East Africa, independent of the Medical organization

at Entebbe and the Veterinary centre now working at Mpwapwa, was recommended. A Director and three officers were appointed, but arrangements for financing the business were not effected until 1927–28. It was agreed from the first that the basis of the control must be oecological.

This, the first report of the new-formed Department of Tsetse Research, is concerned with work of an introductory nature only.

The Department is administered by a Director, Mr. C. F. M. Swynnerton, a Deputy Director and Oecologist, 2 Zoologists, 2 Entomologists, 2 Botanists, and 4 officers seconded to the Research Staff from the sub-department of Tsetse Reclamation.

The Headquarters of the Department are at Kondoa-Irangi (4,500 ft) in the Central Province. The Research Stations are: (1) *Sambala* (4,900 ft.) in the Kondoa District, Western Fly-belt; where an entomologist, a botanist, and a zoologist are stationed, and opportunities are favourable for studying relations between game and *G. morsitans*. (2) *Kikori* (4,250 ft.) with an entomologist and zoologist, where *G. morsitans* is abundant and the distribution and behaviour of game are remarkably different from Sambala. (3) *Itundwe* (4,300 ft.) with an oecologist, where the conditions of climate and soil are (as at Kikori) suitable for observations on experimental poisoning of vegetation and planting of vegetation inimical to tsetse. (4) *Salanga* (5,400 ft.) on the Masai Scarp, which is representative of the greater part of this scarp and has relict patches of evergreen sub-tropical forest suggestive as barriers to tsetse. The 3 last stations are all in the Eastern Fly-belt at the base of the Masai scarp.

Since the research was planned from the first as to be essentially *oecological* it is—apart from its rather overwrought terminology—plainly a prolonged biological study, and has so been distributed at the different Research Stations under the following heads: (1) Reconnaissance, mapping of vegetation, tsetse, and game distribution. (2) General observations of fly in relation to season, weather, vegetation, game and man. (3) Biological environment of *G. morsitans*. (4) Physical and physiographical environment of *G. morsitans*. (5) General relations of *G. morsitans* and game; e.g., preference of the fly for any particular species of game. (6) Alteration of oecological environment as means of control of *G. morsitans*; e.g., investigating utility of dense evergreen shade trees, or the reverse; or effect of killing particular trees; or effect of particular clearances; or of absence of thorny growth inimical to tsetse or game. (7) Direct and Indirect influence of fire in control of fly or its breeding-grounds. (8) Biological control, e.g., study of parasites of puparia. Only one parasite has yet been found, namely the Bombyliid fly *Thyridanthrax abruptus*. (9) Making and arrangement of collections—plants, insects, birds.

As is stated in the conclusion, an encouraging beginning has been made and much interesting experience gained, but for more pregnant experiences and more satisfying results the future must be trusted.

A. A.

Tanganyika Territory. **Tsetse Reclamation Annual Report for the Year ended 31st March, 1929** [Swynnerton (C. F. M.), Director of Tsetse Reclamation].—10 pp. Dar Es Salaam. [1s. 6d.] [n.d.]

The Tsetse Reclamation annual report to March 31st, 1929, reminds us that work was begun in Shinyanga, in 1923, against *Glossina*

swynnertoni and was extended later against continuous advances of *G. morsitans* to Nzega, Mwanza, Kondoa, Manyoni and Singida. Reclamation officers are now at work in all those districts carrying on fresh reconnaissances ; assisting in research, e.g., making roads, fire-breaks, and erecting camps ; mapping the threatened invasion of fly-free territory ; and assisting in the reclamation of infested districts. Details of advances of fly are given in most of the districts named. The questions to be answered are : Can an annual turn out of the natives, *en masse*, against tsetse be assured as a tribal custom? Would the natives settle in an area thus prepared for reclamation? Could effective grass-fires be organized and would they dispose of the tsetses either directly or by destroying bush? In Mwanza and Tabora these questions are answered in the affirmative ; in Shinyanga the annual turn out of natives against fly is an acknowledged custom ; in Lubaga natives are duly settling in the areas cleared by axe and grassfires where infested blocks have been cleaned by departmental fires deferred till September or late August and kindled on a broad front in hot windy weather. The discovery in Singidi-Manyoni of a continuous thicket, 70 to 80 miles long, unattractive to *G. morsitans* and prohibitive to man and to most game except on elephant paths is an outstanding find. Living game-fences, at £17 1s. 3d. per mile, have proved useful. Clearing or burning, and attack on advanced haunts of fly—as in Kondoa and Silia have had obvious good effect. In Shinyanga and several other districts clearings of infested areas are being not only grazed, but also settled by natives. Naturally not *all* large clearings are equally amenable to native settlement, even when they are known to have stopped invasions of fly. Two-fifteenths of a shilling, including supervision, appears to be the approximate cost per acre of actual felling, piling, and burning " bush," and the rate promises to go towards one-sixteenth of a shilling.

A. A.

Rhodesia, Southern. **Report of the Secretary, Department of Agriculture, for Year 1929.**—(Medical and Veterinary. Tsetse Fly pp. 46–50).

As the local fly-front in all its windings measures 600 miles and the resources of the colony are not unlimited, attempts to control fly have to be concentrated at present on places here and there where fly is known to be openly advancing or to be causing loss to graziers. The efforts here most approved are wide belts freed and fenced from game. In the Lomagundi district there are now, with recent additions, 120 miles of such fences to be maintained ; here, although the health of cattle in the protected tracts is generally improved, and the numbers of flies in the newly fenced area is said to be very greatly reduced, cattle disease is not yet suppressed. In the Gatooma district, where some check has been exercised by game-fencing, the great abundance of wart-hogs hinders control. In the Wankie district special inspections show spreading of fly. On the Portuguese frontier the Sabi River valley seems to be free of fly, but in certain other places *G. pallidipes* and *brevipalpis* were abundant.

Attention has been given to study of specific forest characters in relation to records of the past distribution of fly in the colony. Legislation for control of traffic from fly zones has been effected and is about to be enforced. Study of parasites of muscoid flies has been pursued.

A. A.

Schwetz (J.). **Some Ecological Notes on** *Glossina newsteadi* **Austen.**—*Ann. Trop. Med. & Parasit.* 1930. July 8. Vol. 24. No. 2. pp. 211–216. With 1 map in text. [1 ref.]

Glossina newsteadi occurs normally with *G. palpalis* on the banks of rivers, but is also found with *G. fusca* and *tabaniformis* at a distance from water ; it is active chiefly in the morning and the evening, but is sometimes caught in broad daylight. It is here said to be distinguished from most species of the *palpalis* group by its bigger size and lighter colour—points which, according to Major Austen, are not obvious in pinned specimens.

A. A.

Pandit (C. G.), George (P. V.), Mankikar (D. S.) & Natarajan (N.). **A Rat-Flea Survey of the Madras Presidency. Reports IV, V and VI.**—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1223–1257. With 2 maps & 2 charts in text.

Statistics and local commentary of rat-flea surveys of towns in S. India.

(1) Ootacamund and neighbouring village of Ketti, in May–June. Rodents, etc., examined, 212 : *Mus rattus* 125, *Gunomys kok* (also a field rat) 61, the rest house-mice, " bandicoots," and musk-rats. Fleas collected from them, 427 ; *Xenopsylla cheopis* 49 per cent., *Ceratophyllus sp.* 22·6 per cent. (most on *Gunomys kok*), *X. brasiliensis* 14·5 per cent., *X. astia* 9·7 per cent., *Leptopsylla musculi* 3·7 per cent., and one specimen of *Pulex irritans*.

(2) Madras, in July–August. Rodents, 1,025 : *M. rattus*, 1,002, all the rest bandicoots, *no mice*. Fleas, 2,766 : *X. astia*, 2,608 ; *X. cheopis*, 154 ; *X. brasiliensis*, 2 ; *P. irritans* and *Ct. felis*, one of each.

(3) Saidapet (5 m. from Madras), in March–April. Rodents, 378 : *M. rattus*, 367, all the rest bandicoots. Fleas, 1,179, all *X. astia*.

(4) Negapatam, in June–July. Rodents, etc., 466 : *M. rattus*, 456, the rest bandicoots and 1 musk-rat. Fleas, 1,680, all *X. astia*.

(5) Nellore, in April–May. Rodents, 1,047, all except 4 bandicoots being *M. rattus*. Fleas, 3,398 ; *X. astia*, 2,740, and *X. cheopis* 658 (chiefly in graindealers' shops and houses).

(6) Tirupati and Tirumalai, important centres of pilgrimage. Rats, " usual high density in bazaar areas " [species not recorded]. Fleas 793, all *X. astia*.

(7) Tanjore, in April. Rodents, 756 : *Mus rattus*, 699 ; *M. norvegicus* (provisionally identified) 46 ; the rest bandicoots. Fleas, 2,405, all *X. astia* except one *Ct. felis*. In investigating the question of possible infestation of imported grain-bags with rat fleas or their larvae, 26 samples of grain and sweepings were examined at Tanjore. In no case were any adult fleas discovered in the fresh samples, but in three instances samples gave issue to adults (altogether 4 individuals) of *X. astia* in about 4 weeks.

A. A.

Wassilieff (A.). Recherches sur l'épidémiologie pesteuse au Sénégal, en 1929. Les réservoirs de virus. [**The Epidemiology of Plague in Senegal in 1929. Reservoir Hosts.**]—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 737–747. [3 refs.]

After plague started in Senegal, in 1929, about 10,000 rats were examined in the course of 10 months, but only six were recognized as infected, 2 of them at the onset and 4 in the full tide of the epidemic. It is true that the inhabitants of two villages spoke of " rats dying en

masse," but whether this occurred before or during the epidemic could not be ascertained. It is on this basis that the author declares that the precept " first the epizootic, then the epidemic " was not confirmed, and concludes that in Senegal " the plague was interhuman." The rodents caught in the bush were mostly *Mus rufinus* and *Golunda campanae.* In some villages *Mus rattus* predominated. The rat-fleas were constantly and almost exclusively *Xenopsylla cheopis* and (in the neighbourhood of fowl-houses) *Echidnophaga gallinacea.* In one village only *X. astia* was found in May, and it in September had been " replaced by *X. cheopis.*" Gravid females of *X. cheopis* were particularly numerous in April-May ; May-June, when the humidity in the rat-runs was 75°–80°, was their season of increase ; later on, when that humidity was increased to 90°–98° neither rats nor fleas were to be found in the runs. The author's " General Considerations " are not so nicely consistent with his preliminary statements as one could wish ; for although he maintains that the first cases of plague in Senegal were not preceded by an epizootic in rats, he thinks it possible that the plague bacillus might exist in an " invisible form " in rats, and he admits that there must be a link between the plague of wild rodents and plague in man and that the domestic rat is that link. This makes it necessary to seek the actual reservoir of the virus elsewhere ; and from the abundance of *X. cheopis* in Senegal and the fact that fleas are long-lived insects the author thinks it possible that fleas may be reservoirs. He recommends also that the search for a reservoir should include not only wild species of rodents, but also hedgehogs, shrewmice, jackals, etc. Finally, he cites a case, reported by NIKANOROFF, of a Kirghiz with a chronic infection of plague who was an actual carrier of the disease, and he thinks that human cases of the same sort, coupled with the presence of thousands of fleas, may explain the outbreaks of plague in Senegal.

A. A.

WASSILIEFF (A.). Observations sur les puces de la région du Cayor, (note préliminaire). [**On the Fleas of the Region of Cayor.**]—*Bull. Soc. Path. Exot.* 1930. May 14. Vol. 23. No. 5. pp. 474–478. With 1 text fig. [1 ref.]

As a flea-trap the author used a saucer full of oil with a lighted wick, or else a saucer full of weak chloroform-water. The commonest flea of Cayor (Senegal) is *Xenopsylla cheopis. X. astia* occurs, but is rare, also *Ctenocephalus canis. Echidnophaga gallinacea* may be found in hundreds on a single rat. *Pulex irritans* has never been seen at Cayor.

A. A.

DEMARIA (Alfredo) & GALLINATO (Valentin). Pulgas de las ratas de la costa Sur-Occidental de Sud-América. Nota preliminar para el estudio de la distribución y epidemiología de la peste en Chile. [**Rat-Fleas of the South West Coast of South America. Preliminary Note on the Epidemiology of Plague in Chile.**]—*Rev. del Inst. Bact. de Chile.* Santiago. 1929. Vol. 1. No. 1. pp. 35–39. With 4 figs.

In Santiago in the summer of 1928 and 1929 the average number of rat-fleas per rat was 12·6, and the relative percentages 35·5 *X. cheopis*,

28·8 Sarcopsyllidae, 16·9 *Leptopsylla musculi*, and *Pulex irritans* and *Ctenocephalus canis* 3·6 each. Of 893 fleas from 91 rats in port Valparaiso in the autumn of 1929 the relative numbers were 46·6 *Ceratophyllus fasciatus*, 42·9 *Leptopsylla musculi*, 6·4 *Pulex irritans*, 3·1 *Sarcopsyllidae* and 1 *X. cheopis*. On one rat captured in Alameda there were 60 *X. cheopis*, 13 *Ceratophyllus fasciatus*, and 7 *Leptopsylla musculi*. The author concludes that in Chile there are limited foci for development of plague, which has not invaded the northern part of the country owing to the Andes being a natural barrier and to the fact that the rats of coasting vessels harbour relatively few *X. cheopis*.

H. H. S.

Carrion (A. L.). **Third Report on a Rat-Flea Survey of the City of San Juan, Porto Rico.**—*Porto Rico Jl. Public Health & Trop. Med.* 1929. Dec. Vol. 5. No. 2. pp. 158–166. With 7 charts. Also in *Public Health Reps.* 1930. July 4. Vol. 45. No. 27. pp. 1515–1520. With 7 charts.

During the twelve months ending with June, 1929, the number of live rats trapped in San Juan was 249, the Norwegian rat predominating. Fleas were found in 68 per cent.; the flea-index being 7·9 and the *cheopis*-index 7·7. A few specimens of chigger, dog or cat flea, and *Pulex irritans* were caught.

A. A.

Ioff (I.). Materialien zum Studium der Ectoparasitenfauna im Süd-Osten der U.d.SSR. V. Flöhe der Springmäuse (Dipodidae). VI. Flöhe der Blindmäuse (Spalacidae). VII. Die Flöhe der Steppeniltisse. [**Materials for a Study of the Ectoparasite-Fauna of the S.E. Union of Soviet States. V. Fleas of Jerboas. VI. Fleas of Spalacidae. VII. Fleas of the Weasel of the Steppes.**]—*Berichte des Mikrobiologischen Staats-Instituts z. Rostow am Don.* 1929. Aug. No. 8. pp. 1–52. With 18 figs. [Numerous refs.] [In Russian script. German summaries pp. 53–60.]

Several papers, by this author and collaborators, on the fleas parasitic on rodents and other small mammals of the steppes of S.E. Russia and W. Asia have been noticed in this *Bulletin* (Vol. 23, p. 873; Vol. 24, pp. 434, 894; Vol. 25, p. 286). The present papers, which are almost entirely taxonomic, appear to be a revision of some of them. They deal with the fleas of Jerboas (Dipodidae), mole-mice (Spalacidae) and the weasel of the steppes (Putorius). In the Russian version many of the species are redescribed, or characterized, and their taxonomic features figured.

A. A.

Sikes (Enid K.). **Larvae of *Ceratophyllus wickhami* and Other Species of Fleas.**—*Parasitology.* 1930. Mar. Vol. 22. No. 2. pp. 242–259. With 7 text figs. [33 refs.] [School of Hyg. & Trop. Med., London.]

An admirable critical summary of writings on flea-larvae, beginning with the famous Leeuwenhoek (1683) who tried to breed fleas, forms the preface of this paper, and a useful attempt has been made also to furnish a complete list of references to the anatomy of flea-larvae.

The life-history of *Ceratophyllus wickhami* (from the N. American grey squirrel) is described; three larval instars occur and the life-

history under experimental conditions takes on an average 6 weeks ; the external anatomy of the larva is described, that of the third instar in great detail. Brief notice is taken of the larvae of *Xenopsylla cheopis* and *X. astia* ; the two " are practically identical except for the shape of the mandibles."

A. A.

Stiles (C. W.) & Collins (Benjamin J.). **Ctenocephalides, New Genus of Fleas, Type** *Pulex canis.—Public Health Rep.* 1930. June 6. Vol. 45. No. 23. pp. 1308–1310.

" The generic name *Ctenocephalus* Kolenati, 1859 . . . applied to certain well-known fleas, is preoccupied by *Ctenocephalus* Hawle and Corda, 1847. . . . a well-known trilobite, and, under Art. 34 of the International Rules, must be rejected as an absolute homonym." So the authors have discovered, who now propose the new name Ctenocephalides for the fleas at present improperly styled Ctenocephalus, and give their reasons for appointing the dog-flea, *Pulex canis* Curtis, 1826, the type of the new genus. (Incidentally the authors indicate how much more deeply preoccupied is the name " Ctenocephalus " (type *C. tiara*) applied by Linstow 1904 to a nematode worm.)

A. A.

Faust (Ernest Carroll) & Maxwell (Thomas Andrew). **The Finding of the Larvae of the Chigo,** *Tunga penetrans,* **in Scrapings from Human Skin. Report of a Case.**—*Arch. Dermat. & Syph.* 1930. July. Vol. 22. No. 1. pp. 94–97. With 6 text figs. [3 refs.] [Med. School, Tulane Univ. of Louisiana, & Charity Hosp., New Orleans.]

In scrapings from the skin, of the pubic region and its vicinity, of a native resident of New Orleans who had recently been infested with chiggers (*Tunga penetrans*) from a cargo of hemp imported from Yucatan, there were found some hundreds of small moving objects which proved to be chigger-larvae ; they were in an advanced stage ; many of them were thriving, and some were full of blood.

A. A.

Hase (Albrecht). Weitere Versuche zur Kenntnis der Bettwanzen *Cimex lectularius* L. und *Cimex rotundatus* Sign. (Hex.-Rhynch.) Beiträge zur experimentellen Parasitologie 4. [**Further Contributions to Knowledge of the Bedbugs** *Cimex lectularius* **L. and** *Cimex rotundatus* **Sign. Contributions to Experimental Physiology 4.**]—*Ztschr. f. Parasitenk.* 1930. Jan. 25. Vol. 2. No. 3. pp. 368–418. With 9 text figs. [2 pages of refs.]

This dissertation treats of the two notorious species of bedbugs, with occasional references also to *Oeciacus vicarius* and *Conorhinus megistus*. After a long description of an inexpensive and easy method of keeping the insects fed upon mice in the laboratory, the argument becomes chiefly physiological and is concentrated on the nature of the aliment imbibed and of the solid and liquid excreted, and of certain

conditioned circumstances (mainly of temperature) that affect the mortality of the eggs and larvae. In respect of the aliment the author's observations of distended bugs and of bug-excreta point to the conclusion that these insects (like other blood-sucking arthropods) often feed on lymph, or a mixture of blood and lymph, instead of pure blood. About ten pages are devoted to a study of the colour-variations observed in the solid excrement and to the liquid passed after the process of suction. The colour-variations are influenced not only by the quality of the aliment and the activity of the digestive glands, but also by temperature, by moulting, and by age. The observed effects of all these influences upon the excreta are separately and severally described. A study of the effects of temperature on the vitality of eggs and the rate of output of larvae showed that *Cimex rotundatus* needs more warmth than *C. lectularius*, since by exposure for 2 hours to a temperature of – 15° [? C.] all the eggs of *rotundatus* were killed, whereas 24 per cent. of those of *lectularius* survived, and again at the other extreme of 25° [? C. the output of larvae was longer continued for *rotundatus* than for *lectularius* (though shortened for both species at 30°). After long exposure (35 days) to a temperature (2° C.) near freezing-point, about 5 per cent. of *lectularius* eggs hatched, and after still longer exposure to this low temperature the number of still-births became stationary (nimmt die Zahl der "Totgeburten" stetig zu); so that the author permits himself to say that "by these considerations a zero of development is a physiological impossibility" —which is "an absolute biological knock-out." In the long list of references, which fills more than a page and a half, only 3 (Pikkel 1898, Patton 1907, and Patton & Cragg 1913) are anterior to 1914.

A. A.

Rivnay (Ezekiel). **Technique in Artificial Feeding of the Bed Bug, *Cimex lectularius* L.**—*Jl. Parasitology.* 1930. June. Vol. 16. No. 4. pp. 246–249. With 3 text figs. [4 refs.]

In numerous artful experiments for feeding bed-bugs the author found that *heat* was what excited the hungry insects to examine an inanimate object, and that a moist or a too smooth surface (and, of course, a distasteful smell) completely curbed their appetite. In his successful experiments he stretched and fastened a tender piece of chicken-skin (scraped quite free of fat, etc.) as a drumhead to one end of a piece of glass tube. The outer surface of the drum was then carefully *dried* with blotting-paper. Various *warm* solutions (e.g., chicken broth, chicken blood-serum, weak syrup) were then poured into the tube, which was offered to the bugs. Both young ones and adults fed full on them all through the warm, dry, hospitable chicken skin. [What the author claims as novel is the heating of the artificial food.]

A. A.

Keilin (D.) & Nuttall (G. H. F.). **Iconographic Studies of *Pediculus humanus*.**—*Parasitology.* 1930. Jan. Vol. 22. No. 1. pp. 1–10. With 18 plates. [23 refs.] [Molteno Inst. for Research in Parasit., Cambridge.]

The plates here published (I–XVIII), all but two of which relate to *Pediculus humanus* race *corporis*, are described as fragmentary in character,

though recording certain anatomical features in Pediculus not hitherto observed. The mouth-parts are not described, references being given to papers by HARRISON (1916), SIKORA (1916), and PEACOCK (1918). The name *corporis* de Geer (1778) is established as having priority over *vestimenti* Nitzsch (1818), and Phthirus (not Phthirius) as the generic name established by LEACH.

A. A.

V. MALLINCKRODT-HAUPT (Asta). Milbenerkrankungen beim Menschen. Ein neuer Trombidioseherd in der Eifel. [**Mite-Diseases in Man. A New Focus of Trombidiasis in the Eifel District.**]—*Dermat. Ztschr.* 1929. June. Vol. 56. Nos. 2/3. pp. 98–109; Nov. Vol. 57. No. 3. pp. 191–201; 1930. Mar. Vol. 58. No. 1/2. pp. 24–34. With 2 text figs. [Bibliography.]

The introductory first instalment of this paper is a compilation which entertains under their specific names and in their several family alliances, and mainly from the standpoint of the dermatologist in Europe, certain well-known mites that attack the sons of toil in all sorts of agricultural and horticultural occupations and those who handle sundry agricultural merchandize, divers foodstuffs, and other various dry-goods on a large scale. It deals with these mites (Tyroglyphidae, Gamasidae, and Tarsonemidae) on their clinical and (discursively) on their micropathological record, and not as material for biological or taxonomic study. The second and third instalments of the paper deal almost exclusively with the Trombidiid larva *Trombicula autumnalis* (the well-known "harvest mite"), and are prefaced by an account of eight cases of trombidiasis observed at Trier in the Eifel district of Rhenish Prussia.

Under Tyroglyphidae are mentioned some of the food-mites and grocers' itch mites in the respiratory tract said to cause asthma, and Rhizoglyphus. The Gamasidae mentioned are the species of bird-mites (Dermanyssus) that sometimes attack keepers of poultry and cage-birds. The five pages on Tarsonemidae are taken up by *Pediculoides ventricosus* and the alarming exanthem-like epidemics caused by it in many parts of the world among people handling straw, grain, seeds, copra, and other such commodities. The papers on Trombidiidae take summary notice of typhus-like tropical infections spread by Trombicula larvae and are otherwise formally devoted to the European harvest mite (*T. autumnalis*), its well known provenance and seasonal prevalence, the clinical phenomena and histopathology of the rash it causes, and the symptoms, diagnosis, and prognosis of trombidiasis. A copious bibliography of the families reviewed is appended.

A. A.

VITZTHUM (H. Graf). Systematische Betrachtungen zur Frage der Trombidiose. [**A Systematic Account of Trombidiasis.**]—*Ztschr. f. Parasitenk.* 1929. Oct. 12. Vol. 2. No. 2. pp. 223–247. With 7 text figs. [2 pages of refs.]

This is a good compilation, with a good bibliography, on trombidiasis, the distracting itch caused by various species of Trombicula larvae [commonly known in England as "harvest-mites" and in N. America as "chigger mites"—not to be confused with chigger fleas]. The

natural history of the Trombicula larva is described, the nature of trombidiasis is discussed, and the individual species implicated, with their respective synonyms and geographical distribution, are passed in review. Good figures are given (one of them reproduced from ANDRE) of the stylostome—the long suctorial tube, formed by the salivary secretion, by means of which the larva penetrates the skin of the host and disintegrates and digests the surrounding tissue. GUDDEN (1871, *Arch. f. Path. Anat. & Physiol.*) first observed, but did not explain, this tube. JOURDAIN (1899. *Archiv. de Parasitol.* Vol. 2, No. 1 and No. 3) who coined the name " stylostome," discovered its nature

Larva of *Trombicula autumnalis* shortly after beginning to suck blood, showing the stylostome formed by the salivary secretion.

[Reproduced from *Zeitschrift für Parasitenkunde.*]

as a temporary tube the wall of which is formed of solidified secretion from the mouth, and as becoming detached and left in the tissues of the host when the replete larva quits its hold. ANDRE (1927. *Bull. du Mus. d' Hist. Nat. Paris.* Vol. 33, pp. 509–515, with 2 text figs.) describes and shows how the larva, having fixed itself into the cuticle of its host by its mandibles, ejects a salivary or venomous secretion that penetrates and diffuses into, and profoundly modifies, the tissues beneath the cuticle, and also forms the stylostome. In the lumen of the stylostome fine granules of digested matter can sometimes be seen—evidence of an extra-visceral digestion.

A. A.

Nieschulz (Otto) & Wawo-Roentoe (F. K.). Ueber die Zucht von Zecken. [**On rearing Ticks.**]—*Zent. f. Bakt.* I. Abt. Orig. 1930. Feb. 20. Vol. 115. No. 7/8. pp. 486–488. With 1 text fig. [1 ref.] [Inst. for Infectious Diseases & Parasitology, Utrecht.]

A method of feeding ticks (particularly nymphs and larvae) on experimental animals (particularly guineapigs and mice) is described. An oblong piece of fine soft cambric is cut to fit an area on the animal's back, the area intended having been clipped—not shaved. The cambric is then affixed (by collodion) at its edges, on three sides, to the animal's back, the larvae (or nymphs) are introduced beneath it, and the fourth side is then closed by sticking. A stiff broad sort of Gladstonian collar of stiff cardboard is then fastened round the animal's neck ; it can now neither scrape the tiny ticks off nor bite them when they swell, nor can the ticks escape, although they tend to collect at the edge of the cambric shield. The animal thus bedecked can now be left for two days in the ordinary way in a gauze-covered glass jar, until the larval ticks are replete ; holes must then be cut in the cambric shield to let them escape. They tend to collect on the gauze top of the jar, where they can be captured individually and separately confined—for further requirements.

A. A.

Talice (R. V.). Etude histologique de la piqûre de *Dermacentor reticulatus* (Fabricius, 1794). [**Histological Study of the Bite of** *Dermatocentor reticulatus* (**Fabricius**).]—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 173–178. With 6 text figs. & 2 figs. on 1 plate. [5 refs.] [Parasit. Lab., Faculty of Med., Paris.]

A well illustrated account of the effects of the bite of *Dermatocentor reticulatus* as studied in sections of the skin of the ear of the hedgehog. No stylostome is formed. The mouth-parts penetrate into the true dermis, causing not only a superficial epidermatitis but also a deep haemorrhagic dermatitis.

A. A.

Sofiew (M. S.). *Ornithodorus lahoriensis* (Neumann 1908) in Usbequistan. [*O. lahoriensis* **in Uzbekistan.**]—*Pensée Méd. d' Usbequistane et de Turqumenistane.* Tashkent. 1929. Nov.–Dec. No. 2/3. pp. 18–21. With 2 text figs. [12 refs.] [In Russian script. German summary p. 146.]

The author signifies the existence of *Ornithodorus lahoriensis* in Uzbekistan as a fact of importance considering that the question of the carrier of the Persian type of relapsing fever is still unsettled.

A. A.

Sinclair (C. W.). **A Fatal Tick Bite.**—*Med. Jl. Australia.* 1930. Apr. 26. 17th Year. Vol. 1. No. 17. p. 554.

The victim here was a delicate little girl of 3½ years. The (unspecified) tick was found fixed in the left parietal scalp (and removed) about four days after its probable invasion. There was local swelling at the site of fixure and the gait was unsteady. Paralysis of both legs and of sphincters was complete on sixth day, with loss of lower reflexes, and, later, paralysis of fauces. Death sudden, early in seventh day.

A. A.

Franchini (Giuseppe). Distribuzione degli Ixodidi nelle nostre colonie Eritrea. [**Ticks in Eritrea.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Nov. 1. Vol. 10. No. 11. pp. 540–543. With 1 map in text. English summary. [Inst. of Trop. Path., Univ., Bologna.]

The author presents a spot map for twelve species including (new to the colony) *Rhipicephalus evertsi*.

H. H. S.

Engineering News Record. 1930. July 24. Vol. 105. No. 4. pp. 129–130. With 5 text figs.—**Mosquito Control at Saluda Dam.**

The Saluda Dam, situated in South Carolina, is nearly 1½ miles in length at crest level, the length of the reservoir being 35 miles and varying in width up to 14 miles. The very irregular shore line is over 500 miles in length and the surface level alters constantly owing to draw-offs. During several months of the year conditions are peculiarly favourable for mosquito life. Larvae of all types feed near or at the surface close to the shore line, and it is possible to kill them by spraying oil on the water to a few feet out from that line. Where dense growths of vegetation occur effective oil distribution is difficult at times and Paris green is blown over the surface to reach the places inaccessible to the oil-spraying equipment. Local experience has shown that it is necessary to destroy the larvae once a week, but the whole 500 miles of shore line have not to be considered because wind causes sufficient wave action along extended stretches to prevent larvae propagation. A large barge provides quarters for the control crew, space for supplies and a laboratory. Working out from this floating base are three small power boats from which the spraying is done. The small boats have a 3 h.p. out-board motor, a 4 ft. beam and an overlength of 18 ft. Each boat is equipped amidship with an air-cooled petrol engine directly connected to a centrifugal pump of 2-in. suction and discharge. Oil is fed into the suction by gravity through a ½-in. line from a 50 gal. drum placed aft in the boat. The pump delivers through a short section of hose fitted with a ½-in. nozzle. The average proportion of oil to water is about 1 to 100. The pump throws a stream 60 to 80 ft. from the boat which will reach most of the shore line areas while the boat travels along in clear water. The equipment for dusting Paris green on stretches that cannot be reached effectively with the hose stream consists simply of a ½-in. motor-driven portable blower. A portable petrol-generator unit that ordinarily supplies current on the barge is shifted to one of the boats to drive the blower. The Paris green, mixed 5 parts to 100 parts of hydrated lime, is drawn dry by the suction of the blower from a hopper mounted in the boat. One of the main objections to the Paris green treatment is that it must be repeated after every rainfall. The apparatus used for spraying oil is effective, except where the vegetation is unusually dense or there are large trees.

H. Home.

American Journal of Public Health. 1930. June. Vol. 20. No. 6. pp. 628–632.—**Improved Practical and Economical Methods of Mosquito Control. Report of the Committee on Mosquito Control** [Jackson (Lewis E.), Chairman].

The Committee on Mosquito Control undertook experiments with oils and oil mixtures to determine suitable specifications. They

discuss the lethal effects of oils on larvae and incline to the view that the vapours act as toxic agents. Experiments carried out in New Jersey by GINSBURG established the following facts :—

" 1. The toxicity of petroleum distillates is in direct proportion to rate of volatility and inversely proportional to the boiling point.

" 2. From the standpoint of mosquito control, the petroleum distillate oils can be divided into two groups :

" Oils of low boiling points and high volatility, possessing high toxicity to larvae and pupae.

" Oils of high boiling points and low volatility, possessing little or no toxicity.

" 3. Oils boiling from 200 to 550° F. kill larvae and pupae within 30 minutes by exerting a direct toxic effect.

" 4. Oils of high boiling ranges, such as lubricating and similar oils, act simply by suffocation, the rate of kill being in proportion to the thickness of the film and degree of surface tension.

" 5. Larvae, whose respiratory siphons are filled with non-toxic oil, do not develop into pupae.

" 6. Pupae whose trumpets and part of the thorax are filled with non-toxic oil can, under certain conditions, develop into adult mosquitoes.

" 7. The breathing tubes of larvae and the trumpets of pupae can readily penetrate the thin films of oil that are usually applied on mosquito breeding places.

" 8. For highly efficient mosquito control in the field the oil must not only form a uniform film but must also be directly toxic to larvae and pupae."

The toxicity and penetration of a number of petroleum oil distillates varying in boiling point from 200 to 700° F. were tested. The use of Sudan III enabled the red stained oil to be traced wherever it penetrated the tracheae of larvae and pupae. It follows from the experiments that the use of oils should be restricted to those having a low boiling point and high volatility " making up in quick kill for limited lasting qualities."

" If the question of more rigid economy is involved, a mixture of a sufficient amount of highly volatile oil having a boiling point range of say 300 to 500° F. and a high boiling point product such as the cheap waste crank case oil—the final mixture registering a Baumé gravity of 32 to 34°—will give good results as far as spreading and good stable film are concerned. If waste oil is used it is most important that it be very thoroughly strained. For that purpose a series of at least two screens, with the last one not larger than 40 meshes to the inch, is recommended."

The Committee add : There is need for a larvicide which will thoroughly mix in solution with any water in which mosquitoes breed, and effect a rapid kill. It should be effective in at least 1 part in 10,000.

A. G. B.

PETERSON (J. P.) & GINSBURG (J. M.). **Two Years' Study and Practical Use of Crankcase Waste Oil as a Mosquito Larvicide.**—*Proc. 16th Ann. Mtg. New Jersey Mosquito Exterm. Ass., Atlantic City, New Brunswick, N.J.* 1929. pp. 92–101. With 2 plates. [6 refs.] [Summarized in *Rev. Applied Entom.* 1929. Dec. Vol. 17. Ser. B. Pt. 12. p. 245.]

" An account is given of experiments and field observations showing that crank case oil can be efficiently used against mosquito larvae. The oil almost always requires straining, and apparatus for doing this is described.

It does not in itself spread on water, but may be made to do so by the addition of a spreader such as tar acid (containing 25 per cent. cresylic acid) or by adjusting the specific gravity of the oil to 32 or 34° Bé. by the addition of light petroleum distillates. Of these, one of the most satisfactory was found to be a waste product obtained from "varnolene", which is used as a solvent in the varnish industry, etc. It is a low boiling petroleum distillate and possesses the following specifications : Bé. gravity 46·8° ; flash point 96° F., closed cup ; 160° F., open cup ; boiling range, 300–417° F. Like tar acid, it is itself highly toxic to mosquito larvae, whereas crank case oil is not. The lasting quality of the oil mixture is from 2 to 4 weeks, or twice as long as that of fuel oil, and the cost is about half that of the latter.

" A method of calculating the amounts of the two oils to be mixed that are required to obtain a mixture of a given specific gravity is described."

J. F. C. H.

MANSELL (R. A.). **Note on Experiments towards the Production of a Cheap Insecticide for Anti-Mosquito Work.**—*Jl. Roy. Army Med. Corps.* 1930. Feb. Vol. 44. No. 2. pp. 123–127.

Seeking a cheap, safe and effective solution for use as an insecticide spray the author has arrived at the following formula :—

Medicinally pure CCl_4, 1 per cent. and synthetic wintergreen oil (methyl salicylate), 2 per cent., in second quality kerosene, to which mixture ½ lb. ordinary naphthalene balls is added for each gallon. It is stated that in Peshawar this costs about Rs.2·8 per gallon. The commercial " Flit " seems to have been about as effective. [BRUG & VAN SLOOTEN (this *Bulletin*, Vol. 25, p. 278), made a mixture " Rids " of kerosene 89·6, CCl_4 7, methyl salicylate 3·4 and found it effective, but no loss of efficiency followed omission of the methyl salicylate and a cheaper mixture was used of 2 parts of CCl_4 to 100 parts of kerosene.]

J. F. C. H.

GIOSEFFI (M.). La lotta antianofelica in Istria. [**Anti-Mosquito Measures in Istria.**]—*Malariologia.* 1930. Feb. 5. pp. 103–104. Also in *Policlinico.* Sez. Prat. 1930. May 5. Vol. 37. No. 18. pp. 661–662.

The measures adopted have been along the usual lines, filling in and draining of swamps, removing undergrowth, the use of larvicidal fish in some ponds, spraying others with Paris green and general bonification. The results have been most satisfactory. Of 7,211 specimens of blood examined in 1917, 26·3 per cent. showed malarial parasites. In the last 4 years the figure has steadily fallen from 26·6, to 16·3, 3·9 and, in 1928, to 1·1 per cent. Benign tertian is by far the most common, the ratio being nearly 30 to 1 of the subtertian and quartan.

H. H. S.

DOLLOFF (A. F.). **The Use of Stearates (Calcium and Aluminum) as Diluents for Paris Green in Anopheles Control. A Preliminary Report.**—*Public Health Rep.* 1929. Oct. 25. Vol. 44. No. 43. pp. 2588–2594.

The use of Paris green as a larvicide for anopheline mosquitoes, with hydrated lime as a diluting agent, has become standard practice in the U.S.A.

Seeking some diluent which is highly insoluble and lighter than the lime, and which would therefore keep the green afloat for a longer time, the author here reports on the stearates of calcium and aluminium. His experiments show that these substitutes prolong the time before reappearance of larvae from about 3 days to about 5 or 6.

J. F. C. H.

LOUGHNAN (W. F. M.). **Bourgault's Cattle-Fly Trap.**—*Jl. Roy. Army Med. Corps.* 1930. Mar. Vol. 54. No. 3. pp. 208–211. With 3 text figs.

Loughnan gives an account of an ingenious but simple way of ridding cattle of any flies that adhere to them and of capturing the detached flies.

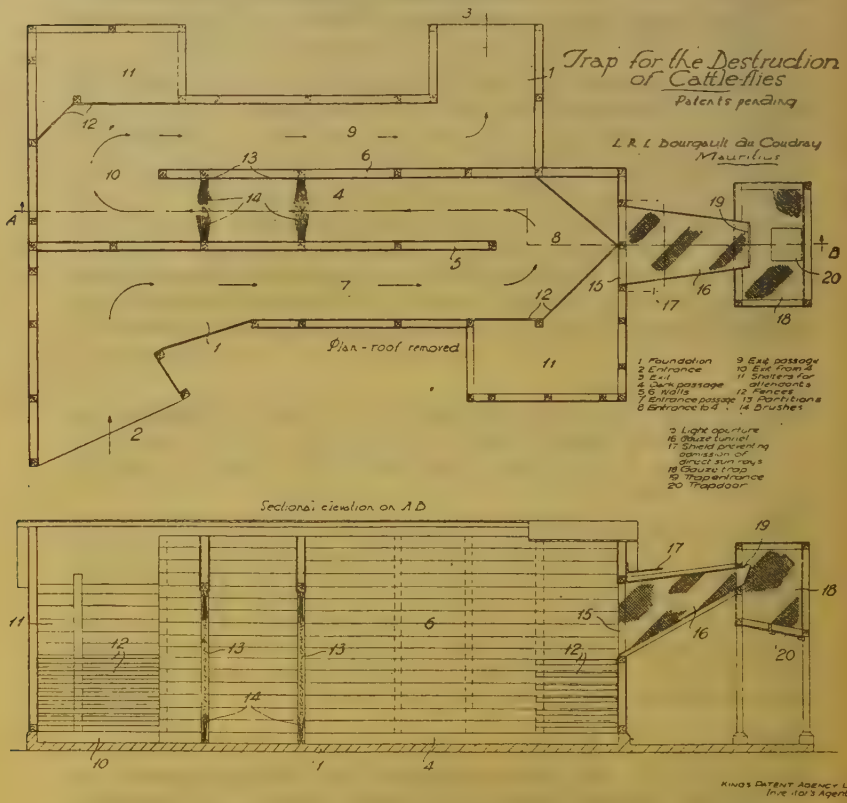

Fig. 1. Plan and sectional elevation of Bourgault's Cattle Fly Trap. The cattle enter at 2 and passing along 7 enter a second passage 4, from whence they pass through the partitions 13 made of branches and coco leaves (see fig. 2). These partitions brush off the flies which then make for the nearest source of light at point 8 where they enter a fly trap and are destroyed.

[Reproduced from the *Journal of the Royal Army Medical Corps.*]

"The trap consists of a darkened building through which the cattle walk and brush off or disturb any flies which may be on them, and the natural tendency of these insects to seek the light is utilized to attract them into a destructor trap."

Fig. 2. Photograph of partition 13 (see plan) made of coco leaves through which the cattle have to pass.
[Reproduced from the *Journal of the Royal Army Medical Corps.*]

The illustrations reproduced should enable the trap to be copied : it has, however, been patented in Britain and some other countries.

J. F. C. H.

Kellaway (C. H.). **The Specificity of Active Immunity against Snake Venoms.**—*Jl. Path. & Bact.* 1930. Jan. Vol. 33. No. 1. pp. 157–173. With 1 text fig. [17 refs.] [Walter & Eliza Hall Inst., Melbourne.]

[Notwithstanding the generally acknowledged specific limitations of snake antivenenes, there has accumulated of late a fair amount of experimental evidence that some "specific" antivenenes do neutralize or mollify the effects of the venoms of other species of snakes.] The present paper records an immense volume of accurate experiment on another side of this subject, namely, on the capacity of an animal immunized to the venom of one particular species of snakes to resist the venom of other species. Throughout the experiments well-grown guineapigs were used (600 to 800 gm.) in very large numbers ; these animals being chosen as susceptible to venom, although sensitive to anaphylaxis.

They were immunized in large batches, severally to venom of Australian Tiger Snake (*Notechis scutatus*), Death Adder (*Acanthophis antarcticus*), Copperhead (*Denisonia superba*), and Black Snake (*Pseudechis porphyriacus*), and Indian Cobra and Russell's Viper, and the capacity of individuals of each batch immunized to venom of the one particular species to resist venoms of other species was tested. The results of the experiments—a mass of interesting detail, qualified, quantified, and tabulated—are not amenable to brief summary statement, but they reveal the occurrence of a fair amount of non-specific (or ultra-specific) active immunity. The following is a bald outline of the evidence.

Of the guineapigs immunized to the venom of the Tiger Snake 15 were tested with lethal subcutaneous doses of Copperhead venom, and 14 showed no symptoms; 14 with Death Adder venom, and 4 survived; 4 with Cobra venom, and all died; 3 with venom of the Australian Giant Brown Snake (*Oxyuranus maclennani*), and showed no symptoms; 2 with venom of the Australian Brown Snake (*Diemensia textilis*), and 1 showed no symptoms; 3 with venom of the Black Snake, and all died.

Of the guineapigs immunized to Copperhead venom 6 were tested with lethal subcutaneous doses of Cobra venom, and all died; 8 with Death Adder venom, and 2 survived; 16 with Tiger Snake venom, and 10 survived; 3 with *O. maclennani* venom, and all died; 2 with Brown Snake venom, and 1 survived; 2 with Black Snake venom, and both died.

Of the guineapigs immunized to Death Adder venom 5 were tested with lethal injections of Copperhead venom, and 4 showed no symptoms; 3 with Tiger Snake venom, and 2 showed no symptoms. The other 2 of the series died on the 13th and the 7th day respectively.

Of the guineapigs immunized to Cobra venom 5 were tested with lethal subcutaneous doses of Copperhead venom, and 2 survived; 6 with Death Adder venom, and 1 survived; 4 with Tiger Snake venom, and 3 showed no symptoms. The nine deaths in this series occurred in from about 20 hours to the 3rd day.

Of the guineapigs immunized to Russell's Viper venom 9 were tested with subcutaneous lethal doses of Copperhead venom, and 2 survived; 7 with Death Adder venom, and 1 survived; 10 with Tiger Snake venom, and 3 survived; and 4 with Cobra venom, and all died in 8 to 24 hours. In the fatal cases of this series the deaths usually were much later.

Further experiments were undertaken to ascertain whether any protective effect against the thrombase of a coagulant venom was exercised by immunization to alien (non-specific) venoms. The result showed that such protection was afforded to Elapine snakes by immunization to certain feebly coagulant venoms of other Elapine snakes, but not by the powerfully coagulant venom of the more distantly related Russell's viper.

The author's main general conclusions are that in active immunity to snake venoms " specificity " seems to be somewhat less strict than in passive protection with specific (univalent) sera; and that active protection against the venom of one species of snake may also give some protection against the venoms *of other closely related* species—the zoological affinity being more important than a close resemblance in the behaviour of the venoms.

A. A.

VELLARD (J.). Spécificité des sérums anti-ophidiques. [**Specificism of Antiophidic Serums.**]—*Ann. Inst. Pasteur.* 1930. Feb. Vol. 44. No. 2. pp. 148–170. [23 refs.]

[A good deal has been said from time to time, ever since the early days of CALMETTE'S Cobra antivenene, about what may be called the

" extraspecific " property of certain antivenomous serums—i.e., their power of neutralizing venoms of snakes other than the species from whose venom they were prepared.] The present paper reports some interesting experimental work based on a brief critical review of this subject.

The snake venoms used in the present experiments were Viperids—*Crotalus terrificus*, *Lachesis jararaca*, *L. lanceolatus*, *L. flavoviridus*, and *Vipera aspis*. The antivenomous serums were anticrotalic, antibothropic, antijararaca, antivenomous serum of Tokio, and Serum E.R. of the Pasteur Institute of Paris. The subjects of experiment were pigeons, and the method was intravenous injection after an hour in contact *in vitro* of given quantities of venom and antivenom. To minimize error in judging specificity of venoms and antivenoms, the action of the different antivenoms upon a selected venom was compared, not the action of a given antivenom upon a series of venoms. The experiments are described.

The author's conclusions from them are : (1) that (for the material studied) all the antivenomous serums always showed a very high specificity for their respective venoms, and that this specificity was observed both *in vivo* and *in vitro*, and for the whole venom as for its components (neurotoxic, coagulant, proteolytic, etc.) ; (2) that all the antivenomous serums also possessed a feeble " paraspecific " power over the venoms of the other species studied, though this paraspecific power was not exercised equally on the different components of a " heterologous " venom and was not in any direct relation to zoological affinities, but was observed only with venoms having pharmacological resemblances. A. A.

VELLARD (J.). Vaccination antivenimeuse. [**Antivenom Vaccination.**] —*C.R. Acad. Sci.* 1930. Mar. 31. Vol. 190. No. 13. pp. 826–828.

Experimenting with certain lipoids (egg-lecithin, cholesterin, and cerebral lipoids extracted by alcohol and ether) the author finds that they modify or destroy the virulence of certain snake and arachnid venoms without affecting the immunizing properties of the respective venoms, and thus can be used in the preparation of specific vaccines.

The specific venom dissolved in weak (0·8 per cent.) NaCl solution is mixed with glycerine (3 gm. to 1 gm. of venom) and the mixture is evaporated to a jelly ; the lipoid is then added (5 gm. to 1 gm. of venom) and the mixture is incubated at 37° (? C.). In the course of time—several weeks or months of contact—the venom so manipulated gradually loses its virulence, but retains its specific immunizing value as a protective vaccine against the corresponding pure venom.

Hepatic lipoids, rich in lecithin, are as attenuants most potent against venoms of S. American crotalines (Crotalus and Lachesis), of *Vipera russellii*, and of sundry spiders and scorpions ; numerous examples are given of the protection imparted to rabbit, guineapig, and dog by attenuated venoms of these crotalines. Egg-lecithin gave perceptible attenuant results against *Crotalus terrificus* venom only. Cholesterin and cerebral lipoids rich in cholesterin were attenuant only against cobra (*Naja tripudians*) venom.

These lipoid vaccines are strictly specific. Their immunizing virtue keeps stable for several years, but is destroyed in 15 minutes by a temperature of 120°. Unlike primitive lipoids they are dissolved with difficulty in ether, and so can be sterilized in that liquid.

It is recorded that the venom of the toad *Bufo marinus* is not modified by any lipoid. A. A.

Lal (Nand). **On the Desiccation of Antivenomous Serum and the Value of the Dried Product as an Antidote against Snake Bite. Part I.**—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 867–880. With 1 text fig. [11 refs.] [Central Research Inst., Kasauli.]

The method of drying the Kasauli antivenomous serum when taken fresh from the horse highly immunized to the mixed venoms of cobra and Russell's viper, and experiments comparing the potency of the dried with the liquid antivenom after various terms of storage are described. The antivenomous serum can be rapidly dried over sulphuric acid *in vacuo* without appreciable loss of potency, and the dried product gives a "practically clear" solution in distilled water constantly up to 2 years. No difference of potency was observed in the two products up to 1 year, but by that time the liquid product was unfit for intravenous injection since it contained a considerable deposit.

A. A.

Billing (Wyly McG.). **The Action of the Toxin of *Crotalus adamanteus* on Blood Clotting.**—*Jl. Pharm. & Experim. Therap.* 1930. Feb. Vol. 38. No. 2. pp. 173–196. [23 refs.] [Med. College, Univ. of Cincinnati, Mount Auburn, Ohio.]

The M.L.D. of dried-venom of *Crotalus adamanteus* for white rats is determined as 0·025 gm. per kgm. (intraperitoneally); about 10 times the M.L.D. for a guineapig, and 6 times for a rabbit. The said venom shows neither a tissue-fibrinogen nor a thrombin clotting action on citrated horse-plasma, to which it is a powerful anticoagulant *in vitro*; it has a specific proteolytic action on blood-fibrinogen, converting it into a more soluble protein (coagulable at 82° C.) and an albumose; and it has little or no proteolytic action on serum-albumin or on fibrin. It contains a protease which appears to be specific for fibrinogen alone. It has a lipolytic action on cephalin, liberating a fatty acid and destroying its power to form thrombin. It destroys, to some extent, the power of tissue-fibrinogen to cause intravascular clotting, when both are injected in a mixture; but if a small (non-toxic) dose of the tissue-fibrinogen be injected simultaneously into the peritoneum (or half-an-hour beforehand) the M.L.D. for a white rat can be reduced from $\frac{1}{2}$ to $\frac{1}{4}$—the cause of which is still being investigated.

A. A.

Essex (Hiram E.) & Markowitz (J.). **The Physiologic Action of Rattlesnake Venom (Crotalin). I. Effect on Blood Pressure: Symptoms and Post-Mortem Observations. II. The Effect of Crotalin on Surviving Organs. III. The Influence of Crotalin on Blood, in Vitro and in Vivo. IV. The Effect on Lower Forms of Life. V. Some Experiments on Immunity to Crotalin.**—*Amer. Jl. Physiol.* 1930. Mar. 1. Vol. 92. No. 2. pp. 317–328. With 8 text figs. [12 refs.]; 329–334. With 4 text figs. [3 refs.]; 335–341. With 4 text figs. [5 refs.]; 342–344. [4 refs.]; 345–348. With 5 text figs. [Division of Experim. Surgery & Path., Mayo Foundation, Rochester, Minn.]

—— & ——. **The Physiologic Action of Rattlesnake Venom (Crotalin). VI. The Effect of Crotalin on a Visceral Organism. VII. The Similarity of Crotalin Shock and Anaphylactic Shock. VIII. A Comparison of the Physiologic Action of Crotalin and Histamine.**—*Ibid.* Apr. 1. No. 3. pp. 695–697. With 1 text fig. [1 ref.]; pp. 698–704. With 4 text figs. [7 refs.]; pp. 705–706. [4 refs.] [Mayo Foundation, Rochester, Minn.]

This is a study of crotalin (rattlesnake venom), a subject which was the theme of the classical researches of the great American physiologist Weir Mitchell. This, however, is an abstruse study of the ultimate effects of

the venom upon animals and animal tissues, as pursued and measured by technical laboratory methods, and its purport and scope are sufficiently summarized and illustrated in the title.

A. A.

Kellaway (C. H.), Freeman (Mavis) & Williams (F. Eleanor). **The Fractionation of Australian Snake Venoms. I. The Venom of the Death Adder** (*Acanthophis antarcticus*).—*Australian Jl. Experim. Biol. & Med. Sci.* 1929. Dec. 16. Vol. 6. Pt. 4. pp. 245–260. With 2 text figs. [17 refs.] [Walter & Eliza Hall Inst., Melbourne.]

An effective method of quantitative fracture of Death-Adder venom, by extraction with 45 per cent. ethyl alcohol, is described. The insoluble fraction retains all the feeble coagulant activity of the venom. The soluble fraction contains the neurotoxic principle. The haemolytic activity appears to be evenly shared. The stimulant action on plain muscle is present more in the soluble than in the insoluble fraction. Titration by subcutaneous injection indicates that almost all the thus recognizable toxic activity is present in the soluble fraction ; but intravenous injection (mice and guineapigs) indicates a fairly even distribution between the two fractions. These are taken from the authors' conclusions.

A. A.

Phisalix. L'immunité naturelle antivenimeuse et antirabique du Lérot commun (*Eliomys nitela* Schreb). [**Natural Immunity of the Common Dormouse to Viper Venom and Rabies Virus.**]—*C. R. Acad. Sci.* 1930. Jan. 13. Vol. 190. No. 2. pp. 138–140.

Madame Phisalix after reminding us that examples of natural resistance to venoms and to the virus of rabies are very rare among birds and mammals (although they are frequent among cold-blooded vertebrates) now introduces the common dormouse into the small company of resistant mammals. Her experiments, here fully described, show that for a dormouse of 50 gm. the minimum lethal dose (subcutaneous) of viper venom is 10 mgm.—enough to kill 25 guineapigs, or (intracerebral) 5 vipers. In encounters between the two animals it is always the little dormouse that is the assailant and the mangled viper that supplies the larder.

The natural immunity of the dormouse to rabic virus is also determined by experiments here described. In October a month before retiring for their winter sleep, 6 dormice received by intramuscular injection, 0·5 cmm. of a thick emulsion of the fixed virus and 2 controls a thick emulsion of normal rabbit's brain. One control and one of the inoculated developed a general cutaneous mycosis, which was quickly mortal. After emerging from their winter sleep of five months none of the others exhibited the least symptom of rabies, and when they were killed 3 months afterwards their brains were found to be non-infective to the brain of rabbits. Further experiment *in vitro* demonstrated the rabicide power of the serum of the dormouse ; the equal mixture of serum and fixed virus, however, though non-infective to the rabbit (in 0·25 cmm. submeningeal doses of a preparation equivalent to a 10 per cent. emulsion of fixed virus) did not confer any immunity on the animal.

A. A.

Otto (R.). Weitere Beiträge zur Serumtherapie bei Bissen europäischer Ottern. [**Further Contributions to the Serumtherapy of Bites of European Vipers.**]—*Arch. f. Hyg. u. Bakt.* 1930. Jan.–Feb.–Mar. Vol. 103. No. 1–3. pp. 165–172. [Robert Koch Inst., Berlin.]

Kraus (this *Bulletin*, Vol. 24, p. 404 and Vol. 26, p. 778) and Moritsch (*Id.*, Vol. 24, *p.c.*) have shown that the venom of the common

European viper (*V. aspis*) is neutralized by the antibothrops (anti-Lachesis) serum produced at the Butantan Institute from S. American viperid venoms. Following them Otto (*Id.*, Vol. 26, pp. 778, 779) has shown that both the antibothrops and the antophidic serums of Butantan have this same protective power against *V. aspis*; but that against the venoms of other European species of Vipera the efficacy of the said Butantan anti-venoms varies in degree. Otto's present experiments give exactitude to the latter statement, in a comparison of the reactions of the venoms of six European species of vipers (including *V. aspis*) with the two Butantan antivenoms and the *V. aspis*-antivenom of the Paris Institute. The original tables must be studied and compared. The European *V. aspis*-antivenom takes 3 full points (*V. aspis*, *V. berus*, and *V. triglav*) 2 " decided " points, and 1 complete failure (against *V. mesocoronis*); the Butantan antophidic antivenom takes 2 full points (*V. aspis* and *V. triglav*) and 4 " decided " points; and the Butantan antibothrops antivenom takes 2 full points (*V. igman* and Hungarian viper), 1 " decided " point (*V. mesocoronis*), 1 " substantial " point (*V. aspis*), and 2 " weak " points (*V. berus* and *triglav*).

A. A.

Renaud (Maurice). Immunisation contre le venin de cobra par les complexes venins-savons. [**Immunization to Cobra Venom by Venom-Soap-Compounds.**]—*C.R. Soc. Biol.* 1930. Jan. 24. Vol. 103. No. 3. pp. 143–144. [1 ref.]

In an earlier paper (see this *Bulletin*, Vol. 26, p. 274) the author showed that cobra-venom can be detoxified by contact (continued for 4 to 6 days) with colloidal solutions of various soaps. In the present paper he shows that the innocuous soap-venin compounds retain their " immunogenous " properties.

A. A.

Arthus (André). Le venin de cobra rendu inoffensif par l'action des rayons ultra-violets a perdu son pouvoir immunisant. [**Loss of Immunizing-Power by Cobra-Venom Detoxified by the Action of Ultra-violet Rays.**] —*C.R. Soc. Biol.* 1930. Jan. 24. Vol. 103. No. 3. pp. 130–132. [3 refs.] [Physiol. Inst., Univ., Lausanne.]

It has been shown that the virulence of cobra venom is destroyed by ultra-violet radiation, and later by Jean Favre that the immunizing power also disappears. In the present paper the latter fact is amply corroborated.

A. A.

Eidinow (Albert). **The Effect of Irradiation on Cobra Venom and Antivenin.**—*Brit. Jl. Experim. Path.* 1930. Apr. Vol. 11. No. 2. pp. 65–72. [1 ref.] [National Inst. for Med. Research, Hampstead, London.]

The technical and experimental detail cannot be condensed. The following is the author's own summary of results :—

" As a result of irradiation of cobra venom and antivenin it has been shown that (1) the neurotoxin present in a solution of cobra venom in saline was destroyed only by rays shorter than 2800 Å.u. unless sensitized with eosin. (2) The photodynamic action of eosin is arrested by the presence

of blood and serum. (3) Haemolysins and cytolysins were destroyed by rays longer than 2800 Å.U., but not by rays longer than 3300 Å.U. (4) Antivenin is resistant to prolonged irradiation as obtained in serum." The source of light employed was two quartz mercury-vapour lamps.

A. A.

Estival (G). Un cas de morsure par *Cerastes vipera* L. [**A Case of *Cerastes vipera* Bite.**]—*Arch. Inst. Pasteur d'Algérie.* 1929. June. Vol. 7. No. 2. pp. 220–221. [Pasteur Inst. of Algeria, Algiers.]

The patient, a native of N. Africa, was bitten at nightfall just above the right ankle. The bite was immediately scarified and treated with $KMnO_4$, and an injection of two ampoules of the antiviperine serum of the Pasteur Institute of Algeria was given. Next morning the whole leg was swollen and excruciatingly painful. Fomentation was kept up, and the pain and swelling subsided in the course of 12 days, during some of which the patient suffered from fever and violent headache. The snake was identified at the local Pasteur Institute.

A. A.

Kellaway (C. H.). **The Venom of *Latrodectus hasseltii*.**—*Med. Jl. Australia.* 1930. Jan. 11. 17th Year. Vol. 1. No. 2. pp. 41–46. With 1 text fig. [10 refs.] [Walter & Eliza Hall Inst., Melbourne.]

An experimental study of the venom of the spider *Lathrodectes hasseltii*, the experiments showing the effects of various doses, both subcutaneous and intravenous, on guineapigs. Like other species of the genus, *L. hasseltii* is venomous, and the author's main conclusions are that the symptoms in animals naturally bitten suggest that the venom has a neurotoxic action; that bronchial constriction plays a dominant part in death, in guineapigs, from the bite; that there is no evidence of the venom having any effect on the coagulation of the blood; and that extracts of the spiders' bodies are powerfully haemolytic. The rabbit is said to be moderately resistant to the venom. [Previous references to venomous spiders of the genus Lathrodectes are to be found in this *Bulletin*, Vol. 19, pp. 497, 846; Vol. 20, p. 801; Vol. 21, p. 169; Vol. 23, p. 875; Vol. 24, pp. 401, 402, 895–897; and Vol. 26, pp. 278, 779.]

A. A.

Beazley (R. N.). **Death from the Bite of a Trapdoor Spider.**—*Med. Jl. Australia.* 1930. Feb. 22. 17th Year. Vol. 1. No. 8. pp. 255–256.

The victim, a stout woman of 46 years, was seen about 40 minutes after being bitten in the thumb. She was collapsed, pulse thready and almost uncountable, retching incessant, then dyspnoea and paroxysms of laryngeal spasm, cyanosis and general lividity. There was no local swelling nor any complaint of local pain. Apart from the laryngeal and pulmonary distress there were no spasms or tremor. The patient was treated with hot bottles and blankets, pituitrin, adrenalin, camphor, and atropin. On admission to hospital (about 4 hours after being bitten) the victim was restless and cyanosed, her breathing was stertorous, she was conscious, but reluctant to speak. Clonic contractions of arms and legs occurred every ten to twenty minutes, with laryngeal stridor and increase of cyanosis. The knee-jerks were increased; the pupils were small and did not react; the corneal reflex was sluggish. The pulse was

almost imperceptible. About 6 hours after being bitten the patient became comatose, but still had laryngeal spasms, and 3 hours subsequently she suddenly died.

Two minute punctures indicated the bite, and two thrombosed small vessels were noticed in the excised skin. The treatment in hospital was local application of permanganate after excision of the bitten area, and administration of stimulants.

At the post-mortem examination the blood was very dark and clots were found in the right chambers; the lungs were oedematous and congested; congested patches were present in the mucosa of the cardiac end of the stomach; the liver was congested in places, also the kidneys and the brain.

The spider was identified as *Atrax robustus*.

A. A.

BUDDLE (R.). **Some Common Poisonous Fishes found in Singapore Waters.**—*Jl. Roy. Nav. Med. Serv.* 1930. Apr. Vol. 16. No. 2. pp. 102–111. With 8 text figs. [5 refs.]

The information here collected about some of the more notorious poisonous and venomous fishes of the Indo-Pacific coasts will be a useful introduction to an interesting subject. Of fishes poisonous to the eater the author concentrates almost exclusively on the Plectognathi —fishes of bizarre form with rough leathery spine-like scales or with a rigid covering of bony plates, and commonly with incisor-like teeth forming a beak. He mentions Balistes (file-fishes or trigger-fishes), Monacanthus, Ostracion (box-fish or trunk-fish), Diodon (porcupine fishes), Triodon, Tetrodon (globe-fishes), the last-named being known as *ikan buntal* by Malays. Two recorded cases of rapid poisoning from eating *Tetrodon stellatus* are mentioned—the first symptoms being giddiness and vomiting, soon followed by fatal convulsions. Some of the Plectognathi can also do damage with their spinous fin-rays and with their beak-like teeth. Apart from the Plectognathi the author mentions only *Scatophagus argus*, " a fish of doubtful edibility, though frequently seen in the markets." Of fishes that inflict envenomed wounds with the spines of their fins the author mentions only the well-known Siluroid *Plotosus canius* (*Ikan sembilan*), the Scorpaenoids *Pelor didactylum* (*lepou*), *Synanceia horrida*, and Scorpaena, and the notorious sting-rays known in the vernacular as *Ikan pari*.

A. A.

GUDGER (E. W.). **Poisonous Fishes and Fish Poisonings, with Special Reference to Ciguatera in the West Indies.**—*Amer. Jl. Trop. Med.* 1930. Jan. Vol. 10. No. 1. pp. 43–55. [6 refs.]

This is an interesting introduction to the subject. The author refers the serious investigator to the great treatise *Animaux Venimeux et Venins*, by Madame PHISALIX [reviewed in this *Bulletin*, Vol. 19, pp. 622–625]. The author emphasizes very fully the fact that poisoning as a result of eating fish is of two kinds: one is little more than an acute gastro-enteritis caused by fish that in some obscure way acts as an irritant; the other is a toxaemia, more enduring and having sequelae not connected with the gastro-intestinal tract, due to a definite toxin secreted by some tissue or viscus of the fish itself—such as the Tetrodon toxin obtained from the ovary of Globe-fishes in Japan (see this *Bulletin*, Vol. 25, pp. 735 and 736).

A. A.

Hoffmann (W. H.). La ciguatera, enfermedad producida por peces venenosos de Cuba. [**Ciguatera, a Form of Fish-Poisoning in Cuba.**]—Reprinted from *Investigacion y Progreso.* Madrid. 1929. Nov. 1. Vol. 3. No. 11. pp. 101–102.

The author gives lists of 27 species of fish the sale of which is absolutely prohibited, of 4 more which are not vendible when adult, and of 14 others which are poisonous according to popular belief, some with a certain amount of scientific support. With so large a number, Cuba would be an excellent place for detailed study of this question.

H. H. S.

Ayer (E. W.) & Neil (J. M.) Protozoa in the Urinary Tract.—*Jl. Amer. Med. Assoc.* 1930. May 10. Vol. 94. No. 19. pp. 1489–1490.

Bauvallet (H.), Bruchan (N.) & Aguessy (C.). Index épidémique palustre à Porto-Novo (Dahomey).—*Bull. Soc. Path. Exot.* 1930. Jan. 8. Vol. 23. No. 1. pp. 106–109.

Carneiro (Homero). Campanha anti-larvaria no impaludismo. Notas e considerações.—*Rev. Med. Cirurg. do Brasil.* 1930. Mar. Vol. 38. No. 3. pp. 109–112.

Cooper (G. W.). Myiasis—Case Report.—*U.S. Nav. Med. Bull.* 1930. Jan. Vol. 28. No. 1. pp. 112–114.

Corradetti (Augusto). Sulle modificazioni delle larve di anopheles in relazione col colore dell'ambiente.—*Riv. di Malariologia.* 1930. Jan.–Feb. Vol. 9. No. 1. pp. 35–39. [5 refs.] [English summary (8 lines) p. 95.]

Ferrari (Antonino). Considerações sobre a ophtalmomyases determinada pela "Dermatobia cyaniventris" Macquart—1840.—*Brasil-Medico.* 1929. Nov. 23. Vol. 43. No. 47. p. 1428.

Gasperini (Carlo Gasperino). A proposito dei culicidi e della lotta contro di essi nell'isola di Rodi.—*Arch. Ital. Sci. Med. Colon.* 1930. Feb. 1. Vol. 11. No. 2. pp. 104–109. English summary (3 lines).

Haga (J.). Tabellen voor determinatie der in Nederlandsch-Oost-Indië voorkomende Anophelinen.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. Apr. 1. Vol. 70. No. 4. pp. 363–382.

Hecht (Otto). Die Hautreaktionen auf Insektenstiche als allergische Erscheinungen. (Kurzer Bericht ueber den Vortrag als vorläufige Mitteilung).—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Vol. 33. No. 3. pp. 028–281 (364–365).

Iyengar (M. O. T.). The Larva of *Anopheles turkhudi.*—*Indian Jl. Med. Res.* 1930. Apr. Vol. 17. No. 4. pp. 1189–1194. With 1 text fig. & 12 figs. on 1 plate. [4 refs.]

Jírovec (Otto). Studien ueber blepharoplastlose Trypanosomen.—*Arch. f. Protistenk.* 1929. Vol. 68. No. 1. pp. 187–208. With 34 coloured figs. on 2 plates. [34 refs.] [Zoolog. Inst., Karls Univ., Prague.]

Knowles (R.). The Evolution of Medical Protozoology.—*Indian Med. Gaz.* 1930. Jan. Vol. 65. No. 1. pp. 23–30. [38 refs.]

Lathbury (E. B.). An Apparatus for breeding out the Larvae of Mosquitoes.—*Jl. Roy. Army Med. Corps.* 1930. Feb. Vol. 44. No. 2. p. 130. With 1 text fig.

Lima (A. da Costa). Sobre alguns anophelineos encontrados no Brasil (2a nota).—*Inst. Oswaldo Cruz, Supplemento das Memorias.* 1929. Dec. 31. No. 12. pp. 275–293. With 41 figs. on 18 plates. [33 refs.]

López (Julio A.). La infección palúdica crónica y su relación con las neumonías. en las zonas palúdicas del noroeste argentino.—*Semana Méd.* 1930. May 1. Vol. 37. No. 18 (1894). pp. 1136–1141. With 1 text fig.

Mukerji (S.). On an Improved Method of dissecting Sand Flies for Parasitological Observations.—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 755–757. [2 refs.]

Pervassu (Antonio). O emprego de peixes na destruição das larvas de mosquitos.—*Folha Med.* 1930. May 15. Vol. 11. No. 14. p. 160–162. With 2 text figs.

Poggi (Igino). Sulla distribuzione di culicidae in alcune isole dell'Egeo.—*Arch. Ital. Sci. Med. Colon.* 1930. Feb. 1. Vol. 11. No. 2. pp. 110–111. English summary (4 lines). [Inst. of Trop. Path., Univ., Bologna.]

Porter (Annie) & Heymann (S. C.). On the Occurrence of *Cordylobia Anthropophaga* in an Infant in South Africa.— *Jl. Med. Assoc. South Africa.* 1930. Feb. 8. Vol. 4. No. 3. pp. 73–75. [2 refs.]

Puri (I. M.). A Note on Two Species of Indian Anopheline Mosquitoes—*A. insulae florum* Swellengrebel and *A. aitkenii* James, with its Variety *Bengalensis* nov. var.—*Indian Jl. Med. Res.* 1930. Jan. Vol. 17. No. 3. pp. 953–956. [6 refs.] [Central Research Inst., Kasauli.]

Simic (T.). Etude comparative de la biologie de *Phlebotomus perniciosus* et *Phlebotomus papatasi* en Macédonie.—*Ann. Parasit. Humaine et Comparée.* 1930. Mar. 1. Vol. 8. No. 2. pp. 179–182. [1 ref.] [Hyg. Inst., Skoplje, Yugoslavia.]

Soesilo (R.). Aanvulling op het artikel van De Rook en Soesilo over *Anopheles papuae.—Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. July 1. Vol. 70. No. 7. pp. 695–696. With 1 fig.

Taylor (Mark R.). Notes on Adder Bite.—*Brit. Med. Jl.* 1930. Mar. 1. pp. 387–388.

LABORATORY REPORTS.

i. Nigeria. **Annual Report of the Medical Research Institute, 1928** [Connal (Andrew), Director].—*Ann. Med. & San. Rep. Nigeria, 1928.* Appendix A. pp. 1–45. With 29 figs. on 5 plates & 1 chart.

i. The outstanding features of this report are, apart from the good printing and the fine and select illustrations, the exact and significant records of rats as focal reserves of plague and the full and precise observations of the local mosquitoes. Other salient points are dermatology, the careful record of 18 cases of blackwater fever, and the list of 45 identified Nigerian snakes, of which 12 are venomous species.

In this, the fifth year of plague in Lagos, 75,639 rats were examined, including 70,067 *Rattus rattus* ("black" rats), 2,418 *Rattus norvegicus* (brown rats), 2,153 *Dasymys rufulus* (swamp rats), and 1 *Cricetomys gambianus* (pouched rat). Moreover, 8,310 mice (*Mus musculus*) and 3,022 shrews (*Crocidura manni*) were examined also. For the first three months of the year the percentage of pregnant rats caught was 5·0; for the other nine months it ranged between 2·9 (April) and 3·9 (June).

Signs of plague were observed *only* in the black and brown rats, the number of infected individuals being 1,214, or one in 60. The month showing the highest percentage of rat infection was, as in past years, October; that showing the lowest percentage was April. (Diagnosis, of course, rested on demonstration of *Pasteurella pestis*). The post-mortem signs of plague, as observed in the 1,214 infected rats, are described in considerable detail. The fleas taken from the rats were, with the exception of 7 dog-fleas and 1 *P. irritans*, all Xenopsylla—from dead rats 4,235 *X. cheopis*, and 2,034 *X. brasiliensis*, and from live rats 2,074 *X. cheopis* and 1,412 *X. brasiliensis*. Among other ectoparasites, especially in brown rats, was the maggot of the tumbu fly (*Cordylobia anthropophaga*).

Records of 18 cases of blackwater fever were received during the year, one of them being in a female W. African infant, and a methodical summary of each case is reported. In epitome, there were 11 recoveries. There had been a previous attack in 4 cases and there was a history of malaria in all. Four patients suffered relapse, one having 2 and one 4 relapses before the urine cleared finally. Subtertian parasites were demonstrated, just before or during the first day of blackwater, in 8 cases.

The venomous local snakes include three species of Naja, *Dendraspis jamesonii* and eight species of viperines, namely, *Causus rhombeatus* and *C. lichtensteinii*, *Bitis arietans* and *B. gabonica*, *Atractaspis irregularis*, *A. aterrima*, *A. corpulenta*, and *A. hildebrandtii*.

Malignant tumours to the number of 36 were identified, 21 being carcinomatous and 15 sarcomatous.

The skin affections that attract notice are crab-yaws, gangosa, creeping eruption due to a nematode, mycetoma in which the fungus isolated is probably *Actinomyces pelletieri*, a fungus isolated from scrapings of tinea flava, a case of molluscum contagiosum in a baby, typical cases of psoriasis rapidly cured by irradiation, a case of favus yielding *Achorion schonleinei*, Bockhart's impetigo frequently encountered among out-patients, and several good examples of herpes,

including an ophthalmic case with well-marked iritis. All suspicious sores and ulcers were carefully examined for leishmania, but this parasite was not struck.

Crab-yaws is here taken to be a true manifestation of yaws. There is always a definite history of yaws. It is cured by N.A.B. treatment. No fungus can be discovered. Quite similar lesions were produced experimentally in monkeys by Schöbl in the Philippine Is. The disease is seen most frequently in native soldiers, police, and prison warders.

Of gangosa 20 cases were observed. Most frequently there is an initial history of a sore within the nose apathetically endured and then spreading and eroding the face. Spirochaetes could not be discovered in serum squeezed from the ulcerated parts. After careful review of the evidence, the author supports the opinion that the disease "is definitely connected with" yaws.

Six cases of canine rabies were reported. Five of them were fully investigated and from one of them successful inoculation of rabbits was made.

A particular bacteriological examination of the local water supply suggests the conclusion that there is a something in the water that destroys or at least inhibits the coliform group as a whole and especially *Bact. coli.*

The entomology report is a model of full and exact detail of practical importance locally. In 2,114 collections of mosquito larvae obtained from 55 different (and severally specified) sources and receptacles during ten months, *Aëdes argenteus* was present in 2,100, *Culex nebulosus* in 838, and *Anopheles gambiae* (*costalis*) in 127. A mosquito-survey of certain local swamps was started and the species caught in 40 collections were identified and are recorded. The abundant mosquito fauna of the "water-lettuce" or "water-cabbage" (Pistia) was investigated and registered, and there has been much other study of the larvae of the Nigerian mosquitoes with a view to future publication of matured results.

A. A.

ii. Nigeria. **Annual Report of the African Hospital Laboratory, Lagos, 1928** [Ramsay (G. W. St. C.), Pathologist].—*Ann. Med. & San. Rep. Nigeria. 1928.* Appendix C. pp. 65–74.

iii. ——. **Annual Report on the Pathological Laboratory, Kaduna, 1928.**—*Ibid.* Appendix D. pp. 75–80.

iv. ——. **Annual Report of the African Hospital Laboratory, Calabar, 1928** [Ramsay (G. W. St. C.), Pathologist].—*Ibid.* Appendix E. pp. 81–89. [1 ref.]

These three reports are of a pattern. They sift and summarize and discuss the record of a busy routine—routine examination of blood and stools for parasites, examinations of urine, sputa, and sera, and observations of the post-mortem room and laboratory.

ii. *Report of the African Hospital at Lagos.* Routine examination of bloods from 2,878 Africans and 745 Europeans disclosed the following parasites: Subtertian malaria in 635 Africans and 114 Europeans; crescents in 27 Africans and 11 Europeans; quartan in 52 Africans and 2 Europeans; sheathed microfilariae in 40 Africans and 1 European; unsheathed microfilariae in 18 Africans. Serological examinations (by Sachs-Georgi and Kahn tests) of 438 cases showed a positive result

for 55 per cent. of Africans and 27 per cent. of Europeans. Routine examinations (single smear, not concentrated) of 1,337 African and 397 European stools gave the following evidence: Ascaris, in 620 and 3 respectively; hookworm, in 367 and 6; Trichuris, in 67 and 3; Taenia, in 9 Africans; *Schistosoma mansoni*, in 6 Africans; *Strongyloides stercoralis*, in 19 Africans; *Ent. histolytica*, in 26 Africans and 13 Europeans, and *histolytica* cysts in 17 and 18 respectively; bacillary dysentery in 10 Africans and 3 Europeans. Eggs of *Schistosoma haematobium* were found in 16 of 496 native urines. Tubercle bacillus in 6·6 per cent. and plague bacillus in 1·19 per cent. of 588 African sputa. In commenting on morbid histology the author states that "cirrhosis is nearly universally present" in some degree in the liver of all West African natives. Two cases of cerebral malaria were observed in African infants (6 and 14 months), the cerebral capillaries lined or blocked with the parasites. In 265 autopsies, 15 cases of pulmonary tuberculosis and 11 cases of tuberculous peritonitis are recorded, also 6 cases of pneumonic plague, and 5 primary cancers of the liver. A remarkable fatality is reported, where the victim caught between the buffers of two railway wagons had the ileum completely divided.

iii. *Report of the Kaduna Pathological Laboratory.* Routine blood-examinations of 4,500 Africans for parasites gave the following figures: *P. vivax*, 0; *P. malariae*, 14 instances; *P. falciparum*, 755 (and crescents, 18); *Spirochaeta recurrentis*, 1; trypanosomes, 15; microfilariae, 8. In the serological examinations a very wide disagreement between the Sachs-Georgi and the Kahn tests is shown. In routine examinations of 1,756 African stools the following evidence is recorded: *Ent. histolytica* in 78 instances, and *histolytica* cysts in 40; hookworm, in 429; Ascaris, in 212; *Taenia saginata*, in 86; *T. dispar*, in 30; *Schistosoma mansoni*, in 42. In 1,320 African urines eggs of *Schistosoma haematobium* occurred in 10 cases. In 111 African sputa 10 per cent. showed the tubercle bacillus, and 6·3 per cent. bronchial spirochaetes. In 40 autopsies 6 cases of tuberculosis (3 plumonary) are recorded; and in 88 specimens of morbid tissue 2 cases of carcinoma of breast and 1 case of sarcoma.

iv. *Report of the African Hospital Laboratory, Calabar.* Routine blood-examination of 1,563 individuals for parasites showed subtertian malaria in 167 cases, quartan in 16, and benign tertian in 2; microfilariae of *perstans* in 384, of *loa* in 80, and of *bancrofti* in 7. Those of *perstans* were of two "varieties." Of 600 patients tested for the Sachs-Georgi reaction 65 per cent. were positive. Routine examination of stools of 1,583 individuals gave evidence of hookworm in 983 cases, Ascaris in 973, Trichuris in 403, Strongyloides in 102, *Taenia solium* in 4, and *E. histolytica* in 56; all stools were re-examined weekly until a negative result was obtained or the patient was discharged. Thirteen cases of urinary schistomosiasis were encountered in 165 urines. A case of retroperitoneal sarcoma and 2 cases of pulmonary tuberculosis were disclosed post-mortem. The effects of protein shock were tried on 9 lepers in the isolation hospital; in six cases no obvious improvement was observed, but in three cases deep chronic ulcers on the soles healed "in a few weeks"; no ill effect could be attributed to the treatment. The results of a visit to the Missionary Leper Colony at Itu, where 616 voluntarily segregated lepers were examined, are described. "As a whole the cases were of recent origin" the average duration prior to treatment being six years. More than 80 per cent. of the cases were

maculo-anaesthetic. In 32 per cent. scabies was observed, being particularly common in children, and it is suggested that this must be of some moment in promoting entrance of the bacilli. Routine nasal smears showed that whereas the nodular and mixed varieties of leprosy had a very high rate of infectivity, less than 10 per cent. of the maculo-anaesthetic cases were actively infectious. In routine Sachs-Georgi tests 42·7 per cent. of the lepers gave a positive reaction, and it is shown that this figure represents the combined syphilis and yaws rates.

A. A.

Gold Coast. **Annual Report of the Medical Research Institute, Accra, and its Branches** [Butler (G. G.), Director].—*Gold Coast Rep. on Med. & San. Dept. for Year 1928–1929.* IX.—Scientific. pp. 54–66.

Routine at Accra shows the usual predominance of subtertian malaria and the low rate of microfilaria infection in 477 blood films, and of Ascaris and hookworm and 1·8 per cent. of Taenia ova in 864 faeces. Of 102 specimens of urine 39 showed eggs of Schistosoma. The tubercle bacillus was found in 29 of 156 sputa. Of 28 tumours examined microscopically 12 were carcinomatous and 7 sarcomatous. One case of death from snakebite is recorded. Of 79 stray dogs examined *Ancylostoma braziliense* was found in 53 and *D. caninum* in 26. Of anophelines found in the quarters attached to the Accra Institute *A. pharoensis* predominated from April to July and *A. funestus* in August and September ; *A. costalis* and *A. mauritianus* were caught occasionally. *Aedes argenteus* was not observed. No plague infection was recorded in (dead) rats examined.

The Sekondi routine, which also shows the enormous preponderance of *P. falciparum*, records the presence of 2 per cent. of *P. vivax* in the total of malaria films. *Schistosoma haematobium* was found only twice in 240 urines. In 29 of 224 sputa the tubercle bacillus was found. Faeces examinations show less than half the infestation with *E. histolytica* recorded at Accra. Of 14 tumours examined 8 were malignant. No plague was found in 2,978 rats examined.

Appendices, dealing respectively with Trypanosomiasis, Malaria in Parturients, and Hookworm experiments, are not included here.

A. A.

Tanganyika Territory. **Annual Report of the Medical Laboratory Dar es Salaam for the Year ending 31st December, 1928** [Clearkin (P. A.), Deputy Director of Laboratory Services].—60 pp. With 3 folding charts, 1 folding plan, 4 figs. on 2 plates & 1 map. 1930. Crown Agents for the Colonies, 4 Millbank, London, S.W.1. [2s. 6d.]

In this methodical report routine examinations of every kind, vaccine-lymph business, special investigations arising mainly out of the routine, and entomology, are each separately considered. In a special series of 169 blood-films all taken about 10 p.m. and from patients not having any appearances of filariasis 55 showed microfilariae of *F. bancrofti* and 1 of *F. perstans*. In two cases of otitis externa (said to be common in Dar es Salám) the only organism revealed by culture was *Ps. pyocyanea*. In 86 serums the Wassermann and the Kahn reactions were compared

and " the value attributed by Kahn to his test as a check on treatment was borne out in our experience." From the Vaccine-lymph Institute at Mpwapwa (3,000 ft. elevation) 388,000 doses were distributed. Investigations of the development and persistence of activity in pulp as yielded from the eruption on the abdomen of the calf showed that activity was greatest in the pulp collected immediately after vesiculation (4th day) and was slightly less active (though greater in amount) on the 5th day, and considerably less active on the 6th and 7th days. Immunity experiments with monkeys showed that ten minimum effective doses of fresh vaccine imparted as good immunity as twenty-thousand. Observations and experiments with material from two cases of doubtful chicken-pox (both with a history of 2–3 years previous vaccination) showed that the " material conferred some immunity against vaccinia and the question arises whether they were chicken-pox, alastrim, or modified smallpox."

The report of the Entomologist consists largely of a general survey of mosquito breeding conditions (mainly anopheline) at various places on the Tanga-Arusha railway—a matter of local interest. The Anopheles found were *A. gambiae* (=*costalis*), *funestus*, *cinereus*, *marshalli*, *natalensis*, *pretoriensis*, and *rhodesiensis*. The continuation from 30th April to 24th August of the rat and rat-flea survey of the last Report includes for the 117 days *Mus rattus*, 453 ; *M. norvegicus*, 9 ; *Xenopsylla brasiliensis*, 491, with an average of 1·1 per rat ; *X. cheopis*, 256, with an average of 0·56 per rat.

A. A.

ZANZIBAR. **Annual Report of the Biological Division for 1928** [MANSFIELD-ADERS (W.)].—*Zanzibar Protectorate Ann. Rep. Med., San. & Biol. Divisions for Year 1928.* IX.—Scientific. pp. 55–70.

The bulk of the Report of the Economic Biologist relates to helminth infestations.

First place is given to details of a quantitative study of Hookworm infestation in groups of natives from various places specified. The incidence in the whole Protectorate is given as 95 per cent., the north-western areas being the more heavily infected ; but the climatic conditions and all soils throughout the Protectorate (even for short periods the sea-beaches, so delectable for the matutinal rite) are favourable for the growth of the larva, and soil pollution is everywhere rife. The average number of ova per gm. of faeces for all groups investigated is between 3,000 and 4,000, and from this and other data it is inferred that the average number of worms individually harboured is about 100. Notwithstanding the high incidence of infection the study of its quantitative distribution is regarded as not menacing. The percentage of Necator found is given as 80. The incidence of Ascariasis is given as 27·3 per cent., but in some villages in the more heavily infested southern parts it was found to be over 80 per cent. Ova of an Ascaris were observed in the faeces of wild pigs. *Trichuris trichiura* infestation is given as 72 per cent., but Tapeworm is stated to be practically unknown in man. Of 411 school children (from all parts of the island) examined 87 showed eggs of *Schistosoma haematobium* in the urine. *Isodora ovoidea* is presumed to be the molluscan host.

The results of a rat-flea survey continued for a year show 243 rats (126 *norvegicus* and 117 *rattus*) continuously caught, and 1,466 fleas—

an average of 6 per rat—all but 31 being of the genus Xenopsylla, namely, *X. cheopis*, 970 ; *X. brasiliensis*, 460 ; *X. astia*, 5 caught on *norvegicus*.

A. A.

MAURITIUS. **Annual Report of the Bacteriological Laboratory for the Year 1928** [BARBEAU (L. G.), Supt. Bact. Lab.]—*Mauritius Ann. Rep. on Med. & Health Dept. 1928.* Appendix I. pp. 16–22.

In the course of routine 431 bloods were examined specially for filaria embryos, and these were found in 109 of them, 100 being *bancrofti* and 9 an unidentified (unsheathed) species. In 480 specimens of sputa tubercle bacilli were found in 96. Of 953 specimens of faeces 646 contained Trichuris, 260 hookworm, 219 Ascaris, 16 Strongyloides, 16 *Clonorchis sinensis*, 1 *Schistosoma haematobium* (origin ambiguous), 52 *Entamoeba histolytica*, 72 *Giardia intestinalis*, 21 *Chilomastix mesnili*, 19 Trichomonas, and 216 Blastocystis. Of 695 urines 53 contained eggs of *Schistosoma haematobium*. Five specimens of squamous epithelioma and 5 excised appendices contained eggs of Schistosoma. Of 97 pathological growths removed 42 were neoplasms, among which were 19 epitheliomata and 8 carcinomata, and 7 sarcomata.

During the current year 2,022 new-borns received B.C.G. vaccine. Definite information also was obtained of 1,086 of the infants that were thus vaccinated in the previous year ; " the death-rate from all causes among these was 5·89 per cent., against 13·15 per cent. for children of the same age in the whole Colony." To elucidate the " periodic " behaviour and the fate of blood filaria in local mosquitoes experiments were carried out with *Aedes aegypti*, *Ae. albopictus*, and *Culex fatigans*, all being fed in the daytime on patients certified a few minutes beforehand ; but whereas the embryos completed their larval development in the Culex, in the two species of Aedes development was early frustrated in the muscles of the thorax. Much study, without much avail, was given to the locally frequentative and mistrusted Blastocystis. Wide, close and prolonged search was sustained by Student CANTIN for the local intermediary host of *Schistosoma haematobium*. In all 3,902 pond-snails were dissected, and cercariae were found in 300 of them (in 117 *Limnaea mauritiana*, 182 *Melania tuberculata*, and 1 *Melania acanthica*—but none in *Paludina vivipara*). Six different " types " of cercariae were recognized, but none possessed the characters of *S. haematobium*. Local monkeys, certified urine and faeces free, and part shaved, were bathed in water heavily charged with the active cercariae ; snails from waters believed to be clean were kept for more than 3 months in water mingled with fresh urine containing eggs of *S. haematobium* ; neither the local ways of this species nor any cue to its local intermediate host were revealed.

A. A.

LIM (C. E.). **Peiping Union Medical College Hospital. Annual Report of the Department of Pathology June 30, 1929.**—7 pp.

Complaint is made of the difficulty of obtaining autopsies. Mention is made of the large number (44 cases) of bacillary dysentery where the organism isolated does not conform to any recognized type of dysentery bacillus. The tubercle bacillus was discovered in a specimen of milk.

A " Laboratory Manual of the Division of Bacteriology " has been published for local use and a Chinese edition has been prepared for publication. Faecal examinations numbered 10,613 specimens from 4,466 cases. The parasites observed in these cases were *Entamoeba histolytica*, 10·2 per cent. (a large majority being passive carriers under treatment for diseases other than amoebiasis) ; *E. coli*, 14·6 ; *Endolimax nana*, 12·1 ; *Councilmania lafleuri* ? 0·42 ; *Iodamoeba buetschlii*, 2·8 ; *Giardia lamblia*, 2·4 ; *Trichomonas hominis*, 2·3 ; *Chilomastix mesnili*, 1·1 ; *Ascaris lumbricoides*, 32·0 ; Hookworm, 6·5 ; *Trichocephalus trichiuris*, 5·0 ; *Enterobius vermicularis*, 0·11 ; *Clonorchis sinensis*, 0·54 ; *Schistosoma japonicum* 0·04 ; *Hymenolepis* nana, 0·40 ; Taenia, 0·67 ; *Fasciolopsis buskii*, 0·02 ; *Strongyloides stercoralis* 0·04 ; *Dicrocoelium dendriticum*, 0·06 ; *Trichostrongylus orientalis*, 0·02.

A. A.

Geneeskundig Tijdschrift voor Nederlandsch-Indië. 1930. Aug. 1. Vol. 70. No. 8. pp. 756–777. With 2 charts. [1 ref.] —Jaarverslag van het Militair Geneeskundig Laboratorium over het jaar 1929. [**Annual Report of the Military Medical Laboratory in 1929.**]

The total number of diagnostic examinations amounted to 20,209 in 1929. From the reports of ths separate departments (tropical pathology, parasitology, bacteriology, pathologic anatomy) the following items may be quoted :—

In amoebic dysentery a substitute for Yatren, natrium iodo-oxychinolin sulfonicum, proved to be equal in its therapeutic effect to the original Yatren 105. Experimental research on " tropical typhus " has not yet yielded any definite result. The importance of systematic search for tropical typhus by means of the Weil-Felix reaction is emphasized. The examination of samples of faeces for worm eggs was regularly performed by means of the cedar oil method besides the usual eosin preparation. Ascaris eggs were found in 57·4 per cent. of the specimens tested, a frequency never seen before.

W. J. Bais.

REVIEWS AND NOTICES.

CALCUTTA. **Annual Report of the Calcutta School of Tropical Medicine, Institute of Hygiene and the Carmichael Hospital for Tropical Diseases 1929** [ACTON (H. W.), Director].—116 pp. With 6 plates & 2 charts. 1930. Calcutta: Bengal Govt. Press.

The Report of the Calcutta School of Tropical Medicine, Institute of Hygiene, and Carmichael Hospital for Tropical Diseases consists of brief summaries of the outstanding work of each particular department of those institutions. Much of this work has already been published and a great deal of it is reprinted in the appendices accompanying the Report, so that it now asks no extensive narrative.

In the department of Tropical Medicine the epidemic dropsy form of beriberi, infantile cirrhosis of the liver, and tropical splenomegaly have been specially studied. In Bacteriology cum Pathology, a wide systematic study of bowel-diseases and the beginning of a comprehensive investigation of affections of the skin are reported. In Protozoology, experimental cultivation of protozoa, and studies in malaria with particular reference to the geographical and seasonal distribution of the three species of parasites of man are specially mentioned, and also the diagnosis of malaria by culture-methods, and the subject of spirochaetosis transmission. In Serology and Immunology, blood-grouping tests, precipitin tests for blood-sucking insects, and serum-changes in tropical disease have been prominent objects of attention. In Pharmacology, study has been devoted to the action of cinchona alkaloids, to the therapeutic value of indigenous medicinal plants, to the lethal effect of various arsenical and other drugs on blood-filariae, to the subject of "drug addiction," and to the physical properties of blood-sera. In Entomology, healthy activity in field-surveys and specific experimental work, and in all that relates to the teaching of medical entomology is recorded. The report of the Professor of Hygiene mentions research on the activated-sludge process and its germicidal aspects, and on the freezing-point of Calcutta milk; that of the Professor of Chemistry describes studies of indigenous medicinal plants, of various other drugs, and of beriberi rice; and that of the Professor of Public Health is diligently directed to practical ends.

In the Kala-azar Research Department (Indian Tea Association) careful experiments to discover how *Phlebotomus argentipes* might transmit the infection—whether by its bite or by its being ingested—have so far not been informative. The results of treatment of the disease by stibosan are considered to be highly satisfactory. The Hookworm Research (Indian Jute-Mills Association) reports a working alliance with the local Zoological Gardens. The Bowel-Diseases Research (Indian Mining Association) relates chiefly to cholera stools, the vibrio, and the bacteriphage. From the Leprosy Report (Indian Research Association, and British Empire Leprosy Relief Association) we may recall the statement that of 325 patients who continued in treatment "over one year" all signs of the disease had gone in 110, 134 were much improved, 62 were slightly improved, and 19 were unaltered. Researches were continued in Diabetes (Mitra Endowment) and in Filariasis (Maharaja of Darbhanga Endowment). The Radiology and Electrotherapeutic Department records the specific diseases there treated and the nature and results of the treatment. In the Pasteur Institute for the treatment of rabies the total attendance during the year was 10,219 (the highest on record), of whom 8,099 completed the treatment [results not here stated]. Dogs were the aggressors in 77·8 per cent. of the cases treated, jackals in 20·8 per cent., cats in 0·8, monkeys in 0·5, and man in 0·2 per cent.; horse, cow, leopard, tiger, wolf collectively in 0·2 per cent.

In the introductory report by the Director recent advances in tropical medicine are reviewed, the value of indigenous drugs and the importance

of indigenous sources are emphasized, the systematic study of skin diseases is commended, and recent benefactors of the School are duly remembered.

The admissions to the School for the year were 36 for the D.T.M. class, 20 for the D.P.H., and 41 for the L.T.M.

Appendix A consists of 27 papers by members of the staff of the School, that have been published in the *Indian Journal of Medical Research* or with its Supplements during the year 1929. Appendix B contains 31 papers of the same general authorship and age, that have been published in the *Indian Medical Gazette* for 1929. These collected papers are a convenient record of the researches completed during the year.

A. Alcock.

CALCUTTA. **Seventh Conference of Medical Research Workers held at Calcutta on 16th to 21st December 1929.**—109 pp. 1930. Delhi: Govt. of India Press.

The delegates to the Calcutta Conference, forty-eight in number and representing all India and Burma, were in session for six days in December 1929 under the presidency of Major-General Sir Henry SYMONS, Director-General I.M.S. After preliminary ceremony the proceedings began with a statement of various proposals now before the Indian Government for harmonizing and systematizing the progress of medical research in India and for conforming it with cognate activities in Great Britain and other parts of the Empire. It was made known that the Government of India had decided that the present Indian Research Fund Association would become also the " co-ordinating agency " for the research enterprises of the prospective All-India Institute of Public Health in Calcutta and of the Central Medical Research Institute at Dehra Dun, and that the governing body of the I.R.F. Association would be correspondingly modified and enlarged for this tri-une status ; and it was signified that the proposals for a Recruitment Board and for a Consultative Board in England, for research, were still in consideration. With regard to the Institute of Public Health it was stated that the Rockefeller Foundation had already advanced to the I.R.F. Association 372,000 dollars of the sum promised for its building and equipment, and with respect to the Dehra Dun Institute that it would accommodate the departments of Bacteriology and Immunology, Malaria Survey, Medical Biology (including Parasitology), and Nutrition. After discussion of these statements resolutions were carried (1) urging that if the resources of the I.R.F. Association were directed towards starting " a new Medical Research Iustitute " its annual grant for its settled " fluid researches " should be maintained intact, and (2) expressing satisfaction with the prospect of closer relations with medical research in Great Britain and the Colonies.

Progress reports of individual researches, set inquiries, and commissions in the programmes of the I.R.F. Association for the year were then heard and discussed. The detail is too diversified and too comprehensive to be considered here ; moreover, it either has been or will be made known in other accessible publications, particularly in the *Indian Journal of Medical Research* and *Research Memoirs*—the mouth-parts of the I.R.F.A. Out of these reports resolutions were passed (1) expressing gratification at the appointment of a bacteriologist for the special study of cholera, (2) pressing that the recommendations of the committee on rabies should form the basis of antirabic policy and procedure in India, and (3) recommending the appointment of engineers, versed in the technique of antimalaria work, to the Malaria Survey department.

The Appendices include Dr. ASHESHOV's report on the Bacteriphage inquiry, a report by Lt.-Colonel KNOWLES on the Spirochaetosis-Transmission inquiry, a note by Lt.-Colonel TAYLOR on the report of the Rabies Committee, a statement of the results of the resolutions passed

by the 6th Conference in 1928, and the provisional budget of the I.R.F. Association for 1930–31. In this last document (which also affords a good bird's-eye view of the routes of study followed in 1929–30) research grants in various parts of India are provided for malaria and its pertinency; plague studies and rat-flea surveys; cholera and bacteriphage; the kala azar commission; the treatment and chemotherapy of leprosy; nutrition and dietetics; tuberculosis; an anti-rabic vaccine inquiry; maternal mortality and infant morbidity, etc.; filariasis and other helminthic studies; sprue; indigenous drugs and drug-addiction inquiries; skin diseases; diabetes; the spirochaetosis transmission inquiry; an osteomalacia inquiry; the therapeusis of Weil's disease; formaldized vaccines; and for several physiological and biochemical studies.

A. Alcock.

Leitch (J. Neil) [M.D., Government Pathologist, Sierra Leone] & Watson (Marion) [M.B., Research Assistant, Sir Alfred Lewis Jones Research Laboratory, Sierra Leone]. **Beriberi and the Freetown Prison. A Report on an Investigation.**—193 pp. With 17 figs. on 12 plates (1 map). 1930. Freetown: Govt. Printer. [10s. 6d.]

An examination of the Freetown Prison records during the last ten years shows that beriberi has been present to a considerable extent in that time; nevertheless, when the present outbreak began, towards the end of 1928, it was at first thought that a hitherto unknown disease was under consideration.

In the past, various Committees had made recommendations for the improvement of the prison dietary, and it is regrettable that these were not carried out, and that owing to faulty control unauthorized diet alterations were made which remained undetected. Hospital records, too, were incompletely kept. Such was the state of affairs when the present investigation was begun in 1929. At this time it was found that out of 252 prisoners, 166 were suffering from beriberi.

From a study of the literature of beriberi the authors found that the consensus of opinion was in favour of a dietary defect as the cause of the disease. With this view they agree. In 1910 a statutory diet was laid down for the prison but unauthorized alterations were made in this, from time to time, and recommended improvements were not carried out. Thus, in the present investigation it was found that the rice was of only average quality, deficient in germ and pericarp, and in some samples infested with weevils. The greens, instead of being spinach, sorrel and creancrean as recommended, were largely composed of potato leaves and there was a 40 per cent. waste from stalk. In addition, the food was often faultily prepared and cooked. All things taken into consideration, including the condition of the prisoners and their work, this statutory ration was 40 per cent. below the standard. It is not surprising that beriberi outbreaks were common.

A detailed study of the symptoms and signs of the disease is given from which it appears that " wet " cases predominated and that prisoners doing hard manual work were more liable to be attacked. A pre-beriberi stage was recognized and many of the early cases ran a very acute course, dying within a few days of the apparent onset.

Post-mortem examinations were made in some instances and the findings were atypical in the early acute cases. Bacteriological investigations did not support the infective nature of beriberi. There is no organism constantly present in all cases and neither by culture nor serological tests could any one organism be implicated.

It was determined, if possible, to obtain full proof as to the causative rôle of vitamin deficiency in the outbreak. Errors in the preparation and

cooking of the food were eliminated, the full statutory diet was given, tomatoes were used freely and an extra supply of Vitamin B was provided. Groups of prisoners with control groups were thus treated for six weeks with these diets and the authors state that " the fact that no fresh cases arose after their institution and that cases already existing slowly recovered proves conclusively that vitamin deficiency was the cause of the outbreak."

Having thus proved to their satisfaction that the prison diet was defective the authors made recommendations for its improvement as follows: For men convicts a standard diet should contain about 3,400 calories for light labour and 4,000 calories for hard labour. Fresh green vegetables are of the utmost importance and every inch of available ground should be cultivated for this purpose. Lettuce, onions and watercress should be issued raw when in season as an addition to the diet.

Bread should be made of flour composed of half ordinary household flour and half brown flour (80 per cent. extraction). It is also suggested that half a pint of cocoa should be issued at 5.30 a.m.; that 1 oz. of cod-liver oil should be given per head per diem (at any rate as a temporary measure) and that an experimental goat farm be instituted for the supply of milk. A sauce made from liver should be issued with " foofoo " at 10 a.m. Precise instructions as to the preparation and cooking of the food are laid down.

In view of the pre-beriberi state in which many of the prisoners are admitted it is recommended that the practice of giving half diet for the first month of short sentences should be discontinued and that low diets should never be given as punishment.

Finally, various reforms in the Prison Service are suggested. More time must be spent by the Medical Officer in the prison and regular inspections by an Administrative Officer should be carried out.

The authors are careful to point out that their criticisms are directed against the office and not against individuals.

A. Douglas Bigland.

MENSE (Carl). **Handbuch der Tropenkrankheiten.** [Manual of Tropical Diseases.] 3rd Edition. Vol. 5. Pt. 2.—pp. vii+847–1418. With figs. 363–556 & plates 6–8 (1 map). 1930. Leipzig: Verlag von Johann Ambrosius Barth. [Paper Rm. 70; Bound Rm. 74.]

The 572 pages contained in this portion of Mense's text book include over 200 pages devoted to literature and index, the literature of each subject being appended to it. The book is divided into two main sections. The first of these, occupying 343 pages, deals with Blood protozoa and the nearly related forms and is written by Dr. R. KUDICKE, of Canton; the second, for which Professor Mense is responsible, is entirely devoted to African human Trypanosomiasis, and occupies 229 pages.

In section one an introduction on structure and development leads up to a consideration of the systematic position of the Blood protozoa. The blood flagellates and allied forms from vertebrates are divided into flagellates possessing one flagellum, but no undulating membrane, with genera Herpetomonas, Phytomonas and Leishmania, flagellates having one flagellum and an undulating membrane with genera Crithidia, Rhynchoidomonas, Trypanosoma, Schizotrypanum and Endotrypanum, and blood flagellates with two flagella with genera Trypanoplasma, Cryptobia and Trypanophis. KUDICKE differs from REICHENOW, who adopted WENYON's classification of Herpetomonas and Leptomonas; he argues that as *Leptomonas bütschlii* is a parasite of worms and possesses a contractile vacuole it appears doubtful whether insect flagellates which lack such a structure should be included in the genus Leptomonas. KUDICKE retains

Patton's genus Rhynchoidomonas, which Wenyon considers should be included in the genus Herpetomonas, and he fixes it in the group of flagellates possessing one flagellum, and also an undulating membrane. The name Schizotrypanum is retained as the generic appellation of the parasite of Chagas' disease, although this name has been sunk as being a synonym of Trypanosoma by many observers.

The Haemosporidia are divided into three families, Leucocytozoidae with genus Leucocytozoon, Haemoproteidae with genus Haemoproteus (=Halteridium), and Plasmodiidae. This arrangement may be compared with that of Wenyon in which the Suborder Haemosporidiidea has two families Haemoproteidae and Plasmodiidae, the genus Leucocytozoon being one of the genera of the family Haemoproteidae. In the family Plasmodiidae Kudicke enumerates four genera: Plasmodium, Laverania, Proteosoma and Haemocystidium, the first three of which are usually included by British writers in the single genus Plasmodium, and the last of which should, according to Wenyon, be included under the genus Haemoproteus of the family Haemoproteidae. These are a few of the instances—there are many more available—which tend to show that standard text books in different countries are still far from agreement in the classification of the pathogenic and related protozoa. While the nomenclature and classification of the vast majority of protozoa are a matter of indifference except to the specialist, they are not so to the medical man in cases where species pathogenic to human beings are discussed. International agreement as to the proper names of the malaria parasites affecting man, and the parasites causing human trypanosomiasis in Africa and South America—to take examples from this book—would be a step of considerable value.

The section on African human Sleeping Sickness follows beginning with history and geographical distribution, dealing next with pathology symptomatology, etiology and epidemiology and concluding with diagnosis, treatment, prognosis and prophylaxis.

With regard to the question of resistance of human beings to infection with trypanosomes, the views expressed are that man is entirely immune against fly proboscis and gut trypanosomes, and largely so against the *brucei-rhodesiense* parasite in *morsitans* and *pallidipes* areas ; such outbreaks as that of the Mwanza epidemic being due to lessening of man's natural immunity by causes such as the stress of war and hunger. The trypanocidal property possessed by human serum is specific, weakened by heating to 56° C., entirely destroyed at 62° C. (syphilitic serum being more resistant) occurs in the eu- and pseudo-globulin fractions, but not in the fibroglobulin and albumin fraction, is diminished in the placenta blood and does not pass the placenta. It is diminished in diseases of the liver, all infectious diseases, ill nourishment and avitaminosis. The serum of man does not act *in vitro* as a trypanocide, it acquires this property only when introduced into the animal body, the serum itself is therefore merely trypanocidogenous. The above summary represents the current views at the time of publication of this Section, but it should be noted that the recent work of Yorke, Adams and Murgatroyd, who show that human serum and citrated human plasma are both actively trypanocidal *in vitro* at 37° C. to *T. rhodesiense*, but not to *T. gambiense*, puts a different complexion on the whole subject of the mode of action of human serum as a trypanocide.

In diagnosis by lumbar puncture, while the author admits that this has been practised by the ambulant method in thousands of cases in Africa without ill results, he prefers this operation to be carried out with care, the patient being in bed and kept lying down for a day afterwards.

An account of the various treatments past and present is given and the merits of arsenic, antimony and germanin (Bayer 205) are compared. A treatment by germanin is recommended.

The book maintains a high standard of performance and is excellently printed and illustrated.

D. B. Blacklock.

PAVLOVSKY (E. N.) & others. **Die tierischen Parasiten und einige parasitäre Krankheiten des Menschen in Tadshikistan.** [Collected Papers of a Parasitological Expedition to Middle Asia organized by the Russian Academy of Sciences and Other Institutions.] 1929. pp. iv+208. With 16 plates & 48 text figs. [In Russian, with German summaries.]

In 1928 an expedition was organized under the leadership of Professor E. N. Pavlovsky, of the Military Academy of Medicine, to investigate the parasitic infections in Tadshikistan (the former provinces of Bokhara, the Pamir Plateau and part of Samarkand district bordering with Afghanistan). The present volume containing seventeen papers by various authors comprises the scientific results of the expedition.

Three papers are devoted to malaria and its carriers, one to sandflies, another to a new form of ocular myasis. Other works deal with tick-fever hitherto unrecorded in Turkestan and helminthic infections.

A. A. MAKARJIN (p. 25) and I. I. MASSAITIS (p. 28) describe anti-malarial measures in Eastern Bokhara and in the town of Kuljab. The bionomics of *Anopheles superpictus* is described by N. I. LATYSCHEW (p. 41). E. N. Pavlovsky (p. 60) observed cases of opthalmomyiasis in man caused by the larvae of *Oestrus ovis* and *Rhinoestrus purpureus*. A paper by P. P. PERFILJEW (p. 20) deals with the classification and distribution of sandflies in Tadshikistan and Usbekistan. E. N. Pavlovsky (p. 84) discusses the rôle of Ornithodorus in the transmission of relapsing fever in Middle Asia. *O. pallidipes* Birula is, according to this author, the only definitely proved vector in Middle Asia capable of transmitting the disease to man and laboratory animals. The actual transmission is effected through the saliva during the act of ingestion. In this species the coxal fluid and faeces play no rôle, since they are not excreted in the act of feeding. The mechanism of infection in other species of Ornithodorus may be different and should be established experimentally since it probably varies with the physiological and biological differences between them. The most common species in Middle Asia are *O. pallidipes* and *O. lahorensis*. *O. kholodkovskyi* n. sp., and *O. coniceps* (= *O. talaje* var. *coniceps* ?) were found in isolated cases only. *O. pallidipes* occurs chiefly in dwellings, where it is found all the year round in wall fissures and among the refuse. It is found on man only exceptionally, while *O. lahorensis*, on the contrary, remains on its host during the winter months and in the nymph stage. The full grown nymphs leave their host in the spring. *O. lahorensis* is found on the walls of the dwellings in spring and in summer. Writing of the history of the discovery of the spirochaete of relapsing fever the author notes that already in 1878 in a letter to the editor of " Letopis Vratchebnaya" (" Medical Chronicle "), G. N. MINCH suggested that typhus and relapsing fevers were transmitted by parasitic insects feeding on human blood. It is thus claimed that the idea of transmission of infectious diseases by insect vectors originated in Russia. Little attention was paid to MINCH's suggestion which was forgotten, although he referred to it in more definite terms again in 1892 in " Vratch " (" The Physician ").

Another paper by the same author (p. 131) deals with elephantiasis arabum in Tadshikistan. A number of cases are described in which the legs, scrotum and penis were affected. Microfilariae could not be detected.

G. G. SMIRNOV (p. 143) examined 408 inhabitants of the town Dushambé for intestinal worms, 54·41 per cent. of which were infected as follows : *Trichocephalus trichiurus* in 43·87, *Ascaris lumbricoides* in 18·38, *Enterobius vermicularis* in 3·67, *Hymenolepis nana* in 1·96, *Taenia saginata* in 0·72 per cent. These figures include the indigenous population and soldiers of the Red Army stationed in the country, the incidence in the latter being lower.

A number of cases of echinococcosis are described by L. F. PARADOKSOV (p. 164). E. N. Pavlovsky (p. 168) gives an account of the local sanitary conditions as they affect the spread of helminthic invasions in the native population (Tadjiks). In another article, E. N. Pavlovsky and A. K.

Stein (p. 186) describe the poisonous effect upon human skin of the beetle *Paederus albipilis* which is similar to that of other members of this genus previously described. These authors also describe (p. 190) the irritant and vesicant effects upon human skin of the beetles *Epicauta erythrocephala*, and various species of *Mylabris*. Owing to the abundance of these insects in Middle Asia there is a possibility of utilizing them for medicinal purposes.

At the end of the volume a programme for future parasitological investigations in Turkestan is set forth by the editor.

C. A. Hoare.

Sociedad Argentina de Patologia Regional del Norte. **Quinta Reunión . . . celebrada en Jujuy del 7 al 10 de Octubre de 1929.** [Fifth Meeting of Pathological Society of Northern Argentine.] Vol. 2.—pp. 707–1534. With numerous illustrations. 1930. Buenos Aires: Imprenta de la Universidad.

This is the second and concluding volume of the proceedings of the 5th Congress of the Northern Argentine Pathological Society (see this *Bulletin*, Vol. 27, p. 863) which was held in October, 1929. The wide range of subjects discussed and papers read shows that the Society is a very live one, though naturally most of the contributions are mainly, if not solely, of local interest. This being so, there is no need here to do more than point out the nature of the work accomplished.

This second volume comprises in all 83 papers, which are divided into 7 sections. The first is concerned with Malaria and Haematology; in this there are 14 papers, 9 dealing with some aspect of malaria. Some are clinical records, others deal with the relation between rice cultivation and the spread of malaria in Tucumán, and the flight of anopheles, while the haematological papers treat of blood grouping and blood chemistry. The second section consists of 8 contributions on endemic goitre and iodine metabolism. The section of Parasitology far exceeds the rest in number of contributions; there are 15 dealing with protozoological questions, mainly with protozoa affecting animals; there are 5 treating of amoebiasis in man, but of no particular importance except as clinical accounts of cases. In the subsection of Helminthology also animal infection occupies the greater part, that regarding man being almost confined to records of examination to estimate the degrees of infestation in comparatively small areas. There are 9 contributions in the division of Pure and Applied Entomology; 3 of these deal with myiasis and 1 by Professor Liebermann is on inter-insect warfare and its practical application to the service of man. This does not go very deeply into the subject and is largely of agricultural interest. The last 3 sections of the volume comprise in all 25 papers on a variety of subjects, covering clinical descriptions of cases both medical and surgical, but all of general, not particularly of tropical, interest; others deal briefly with local regulations for improving milk supply, with school hygiene in Salta, with questions of natural history and the historical side of medicine.

The illustrations are good and adequate in number, while the coloured plates are excellent, and the editors are to be congratulated on having brought their labours to so successful an issue, for the task, even if a labour of love, must have been a heavy one.

H. H. S.